# MODERN GLASS

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# I. THE PRECURSORS OF THE MODERN MOVEMENT

"STEEL and glass," prophesied Eugène Houtart, the master glass-maker and Recorder of the Jury of Class 73 at the Universal Exhibition of 1900, "are without doubt the two elements which will characterise the twentieth century, and will give their name to it." Events proved that he was right. At the same time as industrial machinery was being developed with the most fruitful results—such as the invention of gas furnaces, the improvement of moulds and processes of casting—isolated artists, operating individually, as they did in olden times, were striving to restore to the beautiful craft of glass-making the originality which had been temporarily eclipsed. In the nineteenth century—from the First Empire to the end of the Second—the style of innumerable cut facets was almost universal and the sole form of decoration. Towards 1865, however, a renaissance in glass-making was inspired by the work of a French master, Emile Gallé. He was the leader of a "school" in the widest sense of the term, as decorator, cabinet-maker, potter and glass-maker, and was equally brilliant as poet, orator and controversialist. He was an intellectual athlete, such as the Italian Cinquecento produced, an explorer of all forms of creative thought. Of independent character and exceptional energy, he had no compunction in breaking away from the accepted convention, so venerated in France; his work was wholly inventive, created in accordance with the sane methods of the best epochs—in the material itself "at the point of the tool."

In 1865 he designed white crystal decorations for his father, the glass-maker of Nancy, and was even in those days evolving the "contemporary style after Nature," which was to be a dominant factor in art history until about 1905. The wild flowers of Lorraine provided the two collaborators, father and son, with a rich series of motifs. Gallé christened his table services after the flower themes used in their decoration: the *coupe-liseron* (convolvulus cup), the *jambe-liane* (creeper stem), the *bouton de lis* (lily bud). From his studies of plant life the young artist developed a style which asserted itself from the very beginning. It may here be fitly recalled that the period was one of dreary pastiche, beginning in 1797 with imitations of the antique, and continuing in 1825 with the imitation of "Gothic," and later with the "period" styles which resulted throughout Europe in confusion of ideas and principles. Applied art was no longer the expression of functional or technical necessity, but an archæological hotch-potch. It was not evolved in the workshop, but in the school. A number of intelligent designers, however, who

realised that no art is genuine which is based on imitation, felt the need for reviving forgotten principles. While England, inspired by Ruskin, William Morris and Walter Crane, had recourse to the Primitives, as being nearer to Nature, France, at the instigation of Viollet-le-Duc, resorted to the *imagiers* of the Middle Ages, whose great originality lay in their ingenuity. Gallé profited by what they had to teach, though he fell into error through failing to realise that naïveté is not deliberate, or, to be more exact, that a man of the Second Empire would not think and feel in the same way as a medieval artisan. At the same time the interpretation of Nature in his work took on an entirely new character. It became learned and erudite. He used Latin botanical terms for the simple wild flowers, which to the cathedral sculptors were known by names at once more primitive and more graphic. Inappropriately literary elements were mingled with the master's plastic inspirations. A flagon in the days of the old glass-makers was an expressive form, decorated with tool-worked ornament, and bearing evidence of the nature of the workmanship. It was an object of utility, executed with skill. This sane beauty no longer satisfied the master of Nancy. His choice and elaborate designs resembled the waves of the sea, the despairing appeal of the shipwrecked mariner who entrusts his last message and the secret of his fate to a fragile bottle: "Bottle of glass, bottle with curving sides," he writes in a moving and lovely description, "worn and smoothed and polished, polished by the pounding of surf on shingle, missive robbed of its message, filled with mystery, swollen with darkness and silence. No inscription does it bear save the green foam-specked calligraphy of ocean weeds, dusted dry with silver sand. The seaweed spreads its fan of crimson tracery. In the red depth of the clinging sea anemone gleams the blue of phosphorus . . ." In these rather fantastic terms Gallé describes two of his vases in the magazine *La Plume*. He expresses here so completely his point of view about the decoration of glass, that an important aspect of his work would be neglected if it were not quoted. For the description of the forms and colours of his elaborate vases, Gallé made use of the strangest and most daring epithets, often the more vivid in proportion to their unexpectedness. One vase with a convolvulus decoration is "of a sorrowful rose colour." Another is suffused with "trails of mist which has risen late." In a proud declaration published by the *Revue des Arts Décoratifs* in 1898, he defined his conception of art as follows: "What am I sending to the Salon? Question marks, exclamation marks, appeals, and my very humble testimony that in art as in life truth is best. Yes: materials, shapes, and decorations which are true issue from the contemplation of the realities of Nature, the marvellous evoker of things not seen. Convictions, methods and new crafts are born, in my case, from new needs of expression, and these are, after carving and after etching and enamelling, marquetry on glass, jewelled crystal and intarsia (or engraved) crystal . . ."

So does idealism animate matter in the work of the master of Nancy. His researches,

simultaneously directed to all the possibilities suggested by practical technique, led to the discovery not only of new methods, but of new colours.

While, in 1878, the establishment which set the standard of good taste, the Baccarat crystal works, invented no other style than engraving with discs on glass of absolute purity, Gallé abandoned the "*grand bourgeois*" style. He created the "*clair de lune*" glass, the blue colour being produced by the introduction of oxide of cobalt. The English *Moonlight Glass* and the German *Mondschein* were imitations of this. He obtained unusual colourings and original contrasts of opaque and transparent glass, and was ingenious in turning interesting marbled effects to decorative advantage. For instance, finding three opaque veins in a black bowl, he engraved on it three allegorical figures of Death, Sleep and Silence. On another occasion Venus and her Cupids were introduced to blow the bubbles found in the sides of an amethyst coloured glass. Gallé also made reproductions of natural stones, and with some virtuosity revived the technique of "flushed" and triple-cased glass, which is rich in possibilities. The difficulties of the process had been overcome in ancient times, as is evidenced by the celebrated Portland Vase. By means of this technique he obtained novel effects through inserting gold leaf between two layers of glass, and enriching the surface with transparent enamels, their brilliance being enhanced by the gleaming gold background.

It should be pointed out that Emile Gallé's work was not developed stage by stage. The great glass-maker planned his whole production from the beginning. In 1884, at the Eighth Exhibition of the Union Centrale des Arts Décoratifs, he simultaneously displayed glass coloured right through, marbled, veined and clouded; glass with several layers, in which the surface layer, partly transparent and partly opaque, allowed the colour of the intervening glass to appear; flushed glass, engraved with discs; and lastly, enamelled glass, which he began to make in 1873, and which was revived by his competitor, Broccard. The difficulty of this process, which well repays success, lies in producing an enamel which is both solid and permanent, yet sufficiently homogeneous with the glass itself to be able to undergo—without flaking—the same molècular strains and stresses, which reach fusing point at an earlier stage. At first Gallé used red, white, turquoise, opaque green, translucent blue and gold. He outlined the contours of the design with a brown line, as a guide to his assistants, and in order to emphasise the pattern. In 1884, however, his palette became very much richer, including pale opaque yellows, silver yellows, pale golden-browns, flesh pinks, blacks, vivid dark blues, ivories, shades of "peach" and "faded satin," and lastly, "blond tortoiseshell, clouded with red and whitish tones" which Gallé produced by rolling his hot metal on "*groisils*" of opal glass, and glass reddened by protoxide of copper, strewn over the "marver."

At the Universal Exhibition of 1889, he revealed some new achievements—dramatic colourings, "smoke coloured or blackish, dust-coloured or greenish." He exhibited his

recent discoveries " of veining and marbling in numerous combinations, some opaque, others transparent, malaxations, applications by heat, superimposition of variously coloured layers . . . effects sometimes deliberate, sometimes arrived at by accident . . . coloured or sparkling bubbles, obtained by the addition of substances emitting, when in contact with the fused crystal, vapours capable of forming air bubbles in the hot glass, or of producing iridescence, or of adhering to the walls of these bubbles as a fine metallic coating." Gallé at this time had just succeeded in obtaining " superficial colourings, stains, reflections, flame effects, metallic effects or de-oxidisations in which the metallic oxide of the mixture was reduced into brilliant solid droplets, appearing as small excrescences in the glass in which they are embedded. These flame effects, metallic beads, and iridescences, are produced by the action, either reductive or oxidising, of the atmosphere of the furnace on the glass, which is put to the mouth of the furnace, coated while hot with special compositions." Gallé would also speak of his " jewel-enamels " in which the difficulty was to " find a composition which does not injure the gold and is transparent enough not to interfere with the play of metallic reflections." He applied to glass the process of " *champlevé* " (cutting out on copper), hollowing out cavities in the glass, which he then gilded and filled by heat with translucent enamel.

To hollow out glass is a difficult operation, especially in the case of certain glasses with a potash base, which are particularly hard. The Nancy artist invented a process especially fitted to it. He devised a lathe with a vertical disc for engraving thick crystal deeply. He rightly considered that for every *effect* desired there should be a special *method :* either with the tool, which excavates and is manipulated to taste, or else hydrofluoric acid for hollowing on a larger scale. Commenting on these various processes, Gallé propounds a valuable lesson in style: " If acid could have saved me any unnecessary delays," he observes, " in excavating round the designs which were to be isolated, and by removing the background, I should not have hesitated to employ it, as art is to be judged by the final result. But in my work I have to encounter spoiled materials, superimposed coats which flake away, varying density, composition and thickness unsuspected by the craftsman before they were revealed by the tool; it is easy to see, therefore, that the slightest attack of an invisible agent may ruin everything, and that nothing can replace the hand of the artist who knows what he is about. Although acid cannot think, nor add finish nor model, it cuts into certain glasses in a manner of its own. I have used these rude etching methods for removing an archaic effect from decoration, from areas to which I was anxious to give a *genuine*, not a *manufactured* aspect."

We should do well to remember these pronouncements of a great artist on the nature and the effects of different methods of glass work. With the development of ideas and the evolution of a culture which will lead to a preference for the rare rather than the perfect, it is right that the *true* should prevail over the *deliberate effect*. Gallé has

the singular merit of having put into practice these discriminating theories, and opening many roads to all his successors.

He was also one of the first to reinstate, or attempted to do so, the fine tradition of the artisans who put, not art—an incongruous word—but taste and feeling into all their productions. With equal pride and justice he wrote, in his remarks addressed to the Jury of the 1889 Exhibition : " Neither I nor my workmen have found it impossible to reconcile cheap production with art : *we do not consider that the commercial guise of crystal need necessarily be in bad taste.* . . . In my cheap productions I have avoided all that is false, mis-shapen or brittle, I have used colours that endure . . . " But he signed and authenticated them, and in consequence lowered to the standard of manufactured products original works for which it would have been wiser to reserve a special stamp. The master of Nancy did at least sketch the programme for a new kind of glass-making—repetition of the same design, which is as different from original work as a drawing is from the prints reproduced from it in large numbers, different above all in that, being executed by others, it is not itself an invention. It is not the inspired solution of an æsthetic and technical problem ; it is not a moment in the life of the glass, but the execution of a design studied at leisure, and unrelated to the material in its malleable state, subject to the variations of heat which modify the expression of the original idea. It can, of course, be effective and extremely decorative, but it is none the less a product of an industrial nature, which has its place, and that an important one, in the history of glass-making, but is a thing quite distinct from an original work.

A famous glassworks, also of Nancy, is that of the brothers Daum, which at an early date specialised in the repetition of the same pattern in quantity. It was founded about 1875 by Alsatian craftsmen who were for the most part ceramic workers. The only type of glass which was then of any importance was glass cut into facets, and no one apart from the ceramic workers had exploited the arts of the furnace. Auguste and Antonin Daum at the beginning confined their efforts to the application of gold ornament, in the muffle furnace, to shapes which preceded the Arabian glasses, which were decorated with scrolls and leaves of gold. Then, towards 1894, appeared their " Egyptian " vases, and later, before 1900, the designs based on Germano-Swiss models of the Middle Ages. At the same time, Messrs. Daum studied the inserted decorations, which Eugène Rousseau had created from 1884 onwards. Realising the instability of soft enamel for decoration, they adopted two different processes. One consisted of covering the molten glass with powdered enamels or "*groisils.*" These were then exposed, during re-heating, to a reducing quality of temperature which set up iridescence. The other consisted of " flushed " glass, which they have always preferred to any other means of obtaining coloured glasses. By varying the thicknesses, the body of the glass gleams with many delicate nuances, and so achieves its individual effect. The method

likewise provides the engraver with unlimited opportunities. Beneath each coloured layer he comes upon another tone, and " cameo " engraving applied to this " jade ceramic," as it was then named, suggests to the artist an almost infinite series of contrasts in colour. Disc engraving was also a Daum speciality, and they used it to great effect in decorating their lamps—bedside lamps and hanging lamps—with milky globes on which were engraved the emblematic figure of some bird of night, harbinger of silence and of calm. " The disc engraver," declared MM. Daum, in their description for the 1900 Exhibition, " does not work in a haphazard or automatic way. He ' prunes,' adds personal touches, enlivens or tones down as he thinks fit. Discs made of steel, copper, lead, wood or cork, emery powder and pumice stone, and the innumerable methods of polishing and smoothing, give the glass a delicacy which is as pleasant to the touch as to the eye."

The technical method, however, chiefly employed by the brothers Daum was that of engraving with hydrofluoric acid. Different kinds of glass, of course, according to their composition, respond differently to the action of acid. Some are *hard*, others *soft*. Corrosion in the former is regular, but in the latter it is wrinkled, uneven and " frosty," resulting in the most varied effects. In 1890, the Nancy works first tried exposing their engraved work to a strong bath of acid, and cleverly combined both effects, obtaining a contrast between the roughness of the " frosting " and the smoothness of the unengraved parts. In due course they used acid engraving with the " flushed " effects, and detached gold or enamels against a coloured frosted background. It is the latter process which has gradually developed with the Daums to the extent of becoming the chief characteristic of their industrial productions, though they continue to execute special pieces with the disc—the traditional tool of stone cutting. The development of the modern æsthetic style, which ordains bare spaces, clear, decided design and restrained decoration logically related to the form, has, since 1925, favoured the adoption of the technical process of engraving by acid. It should be mentioned that the Nancy works continue using this process without combining it with machinery. Paul Daum, the successor to the brothers Daum, and present head of the family business, does not forswear the use of machinery should it ever attain the subtlety of manual work, but up to the present he does not consider that it has reached this point.

These glass-makers, who prolonged their efforts sufficiently long to be able to compel public recognition, do not make up the sum total of the 1890 movement. Artists, glass-makers and engineers made valiant contribution. Eugène Rousseau, Gallé's competitor, began in 1884 to distribute coloured glass dusts in the thickness of the walls, and in this way obtained a great variety of materials, similar to natural gems. He would lay these glowing films over surfaces crackled by cold water. He was also a master in the technique of " flushed " glass, as is proved by the pieces dating from 1885 displayed

at the Musée des Arts Décoratifs in Paris. Later, under the influence of Japanese art, Eugène Rousseau sought other effects through the combination of colours and transparency with engraved work. In 1887 he made over his factory to Léveillé, who was a decorator, not a glass-maker, but conversant in the craft. He personally superintended and directed the execution of his designs, and invented certain new processes, that, for instance, which consisted of " flushing " the strass or clear crystal, coated with coloured compositions, with an unpolished film. Among the glass-makers of originality should be counted Joseph Broccard, who specialised in enamel decoration in the Arabian style, so perfectly executed that it was commended by the Jury of the 1900 Exhibition. The Appert brothers, masters of the Clichy glassworks, were technical experts in the thermochemistry of colours, and produced new materials, such as *opaline*, a glass composition used for coating walls, and *cathedral* glass, but they also worked as individual artists, and about 1883 took part in the general movement towards innovation, evidence of which is a curious yellow bowl, with a decoration of opaque clouds embedded in the material. With them is to be associated the name of Pannier, a characteristic piece by whom is preserved in the Musée des Arts Décoratifs, a jug dated 1888, decorated with a South American parrot—the head and tail being formed of the red upper layer, and the jade green plumage furnished by the under layer, engraved in relief. Reyen, who was awarded a Gold Medal by the Jury of the 1900 Exhibition, and who used enamel decoration in an original manner for *malfin* glass, that is to say, imperfectly refined glass, may be counted among the most original and gifted of the men who, between 1900 and 1907, supported the Mellerios of Aubervilliers, workers in intercalary decoration; and Michel, who continued the crackle technique of Eugène Rousseau; and Farge, who revived filigree glass; and Manzana-Pissarro, one of the most subtle modern experimentalists, who manipulated translucent enamels with rare delicacy and personal taste; lastly, the master who will be regarded in the history of the arts of the furnace as the successor to Gallé, not from the technical point of view, but because of his influence on others, and the abundance and diversity of his production: René Lalique.

# II. GLASS-MAKING OF THE PRESENT DAY

René Lalique started his career as a goldsmith, but sought expression in new processes, and on his estate of Clairefontaine, near Rambouillet, he began the researches which transformed him from a master-goldsmith into a master-glass-worker. At the beginning he experimented with the Chinese *cloisonné* method. He constructed great braziers of strong sheet-iron which were heated by charcoal. These were lined with refracting bricks in which the powdered uncoloured glass was to be melted and ultimately shaped. To this period belong one or two works preserved in private collections, notably those of Henri Menier and Guebelkian. René Lalique realised the vast field that was opening to his enthusiastic enterprise. He ceased to make jewellery, which he considered offered too little scope, and extended the range of his art by making use of different processes. About 1902 he rented a glass-bulb factory, with four glass-makers as his assistants. A French perfume manufacturer commissioned from him a series of scent bottles, and this provided the opportunity he sought for "learning the trade." He bought the glass-works, installed modern apparatus, and devoted his time to a series of technical researches which established him in the front rank of contemporary glass-makers. His method is to "found" the metal from friable silica to a plastic condition, exhibition pieces being made by moulds taken from the original wax model. He employs the classic method which craftsmen have too much neglected: blowing the mass in a mould. And lastly, he uses the stamping press, a process now twenty years old, which this master was one of the first to employ. It is apparently a very simple process, or rather has come to be so. The glass-maker's press is composed of two elements: the actual mould, consisting of two jaws, one of which is fixed, and the mandrel, controlled by a large lever. The operator collects a certain quantity of glass in a state of fusion, which he allows to run into the mould. At the proper moment his assistant severs with shears the thick, glowing-red mass, then pulls down the lever as far as it will go. The mandrel is set in motion and pushes the molten glass into the two jaws of the mould, which press it and shape it simultaneously from within and without, imprinting on the soft mass every detail of the decoration. This method, of course, cannot be used for closed vessels, and there is, too, a risk of breakage during the cooling process. There is also some difficulty in constructing anything on a large scale—statuary, for instance—the problem being to avoid the premature contraction of the cooling surface over a core which retains the heat. In René Lalique's opinion an operation of this kind would take several months.

In any case, the master glass-worker has since 1924 executed a number of statuettes

and high relief work: bowls, vases, clocks, chandeliers, plaques for furniture and electric light fittings, door panels, parts of fountains and altar screens—all in glass: sometimes opaque, sometimes tinged with sepia, or black, but more generally in extremely clear and translucent untinted glass, characterised by extraordinary purity. Lalique's glass has the ethereal brilliances of Arctic ice. Its texture is hardly visible, and one can scarcely believe that it was once a thick, opaque substance, shaped by running into a mould; it would seem rather to consist of immaterial ether, the frozen breath of the Polar night. Few artists have been so sensitive to the austere charm and the delicate chastity of the absolute transparency of glass, or have responded to it with the sincerity and subtlety of René Lalique. He is the champion of uncoloured glass, and as such, no less than through his actual formulæ, his work marks a fresh stage in the history of glass-making. When René Lalique was bringing to light the results of his first experiments, Emile Gallé's formula constituted the epitome of the art of glass-making in the eyes of connoisseurs. His complicated and skilled productions, in which the substance itself was disguised, were regarded, not without reason, as masterpieces in the technical sense. In this direction every possibility had been exhausted. No one could carry the art further than Gallé, whose magic touch transformed glass into precious stones. Lalique, however, revealed the beauty of glass as glass. His relief technique, with its adroitly selected design, gave full effect to rich material and rare craftsmanship. In a style which was altogether French, and with an instinct for broad effect unknown to the Venetians of the sixteenth century, he created a formula no less exquisite than that of Murano.

The work of René Lalique may be divided into two categories: the "original" pieces, that is, executed in a manner which makes them unique: the process "*cire perdue*," glass blown into a clay mould, and glass shaped by a power press. We will deal later with the use of glass for light-fittings and tableware. At this stage its development will be traced in the realm of interior decoration. René Lalique was the first to use glass in association with ordinary building materials for large monumental pieces, notably in conjunction with steel. In the framework formed by the partitions of a steel door he set glass panels, whose thickness made them proof against breakage, and at the same time accentuated their luminous quality. The motifs are at times taken from Nature, such as the flock of sparrows on a briar-rose which he made for his own home, or else, yielding to the modern taste for geometrical, linear and almost impersonal ornament, he designed panels decorated with scrolls, spirals or truncated pyramids, the patterns catching the light with still greater brilliance than the transparent background. In 1930 he made the altar rail for a church, with three panels, consisting of long glass strips decorated with a design of lilies. This will rank as one of the greatest successes, not only of the master himself, but of the whole of French decorative glass work. René Lalique has been to an equal degree occupied with the construction of statuary in glass, such as the great

fountain, with its seventeen cascades, each consisting of eight panels with figures in high relief, shown at the International Exhibition of 1925. This was the first example of a new conception in decorative statuary. It possesses special interest as coinciding with the development of the use of pure glass in architecture and interior decoration in the form of plaques and tiles free of any decoration. Glass statuary is cleaner, purer and more sparing of detail than any other, and is therefore all the nearer to the modern conception of the beautiful.

Aristide Colotte, of Nancy, who was formerly an engraver, has for a number of years been inspired by the same ideas. At the Salon des Artistes Décorateurs, he exhibited a series of pieces of great character: the fish, for instance, made from a single block of crystal 100 lb. in weight, and in particular a dramatic bust of the Sorrowing Christ made from a block weighing 500 lb. The metal, of very pure crystal, was extraordinarily brilliant, and its effect was enhanced by portions being chiselled, the light being caught and refracted in the translucence of the glass. M. Colotte was unanimously accorded a place among the masters of fine glass work.

In contrast to these interesting experiments in technical processes unknown to the old masters, is the brilliant revival of ancient methods led with unchallengeable authority by Maurice Marinot, a painter who turned glass-maker. It was in 1911 that this artist first thought of using enamel for decorating the glass which was being executed to his design by his friends, MM. Viard, glass-makers at Bar-sur-Seine. To his keen mind this was the opportunity for experiment in an unexplored field. Maurice Marinot had preserved a number of admirable water-colour drawings, and he decided to exploit this experience in the service of enamel, which was to be improved by closer incorporation with glass as a background.

The monk Theophilus, author of the learned *Schedula diversarum artium*, gives us clearly to understand that in his time enamel was baked at a fairly low temperature; in consequence it did not adhere satisfactorily. Nowadays, too, generally speaking, glass-makers fuse enamel at a mean temperature of 600° C. Applied at this heat it gives the impression of being a cold, over-glaze application. Maurice Marinot tried at first to combine the two elements, decoration and background, by applying greater heat. The heat, however, which it was planned should give greater brightness and transparency to the enamel, tended to distort the vessels. A hard, thick glass was necessary, and repeated firing. The experience gained in this way revealed to the young master certain peculiarities and phenomena in working, which he eventually turned to extraordinary profit. By varying the thickness of his enamels, he obtained modulations of which he alone held the secret. He accidentally discovered—theoretical chemistry, which he often consulted, being powerless to provide an exact forecast of the reactions he wished to exploit—the affinities of the powdered minerals which great heat would transform into

enamel. Maurice Marinot is not simply a workman, promoted from the bench and armed with recipes and manual skill. His intelligence is constantly at work, even while he is engaged in further inventions in the light of his acquired experiences. He is by no means the slave of his own skill. All his efforts are discoveries, and the knowledge gained is at once applied to still further research.

The enamelled glass-work of Maurice Marinot, examples of which are in the Luxembourg, the Musée des Arts Décoratifs, and the Musée Galliera, shows clearly the course of the master's development. The earliest consists of enamels on glass, the enamel filling the principal *rôle*. Then, when the master had gained knowledge of his material, just proportion was established between the glass and its decoration. The enamel itself, like a jewel gleaming on a nobleman's finger, arrived at the stage of conferring full value on the luminous background against which it was set, and thus resulted a new achievement.

Maurice Marinot applied himself to learning the craft. At thirty years of age he became a learner, and took his seat at the glass-maker's " chair." At the Viard works, under the supervision of an old workman with great experience and love of his art, he learned to blow glass, just as the " Gentlemen " did once upon a time, and was faced with a whole series of new problems—new to him, but also to most glass-makers—which he attacked with all the zest of his eager intelligence, his keen desire to know and to achieve success being almost torture to him. He himself has expressed in happy and singularly moving terms how he learned the beauty of the craft.

" An understanding of the effects of weight dominates the whole process of glass-making. Glass can only be blown when a heightened temperature has made it very malleable. The weight of the ductile mass at the end of the blow-pipe tends to make it continually lengthen out and hang downwards, and it is only by constantly rotating the tube that balance is maintained and the shape preserved. The glass-maker's tube is not only an implement for blowing. It is a kind of lathe, movable in space, on which the vessel is turned and shaped by contact with the tool applied to it. A constant, instinctive judgment of the degree of heat in the glass is necessary, so that the worker may adapt the scope and speed of his movements to the ductility of the glass. The working of glass, therefore, consists in blowing it while rotating ; in forming it while it is alive with the life given it by the fire. And all this must be done with decision and flexible judgment in a very short space of time, and with no possibility of rectifying mistakes."

From the year 1912, Maurice Marinot, without altogether renouncing the decorative qualities of enamel, devoted himself to demonstrating, by means of judiciously designed shapes, the essential qualities and properties of glass ; its transparency and its brilliance. In some instances the artist uses acids for excavating deep cuts with " nipped " edges in the sides of the vessel, producing a multitude of interior reflections and interplay of sparkling lights. In others, he employs acid to frost the interior surface of the vase, or else he

alternates the frosting with broad spaces of polished glass, or again, by means of patient and deep-bitten corrosion he achieves an effect of sculptured relief on the outer surface. Sometimes Maurice Marinot employs the engraving wheel; the vessel in this case has no other decoration but that consisting of softened planes, the artist being careful not to efface the sharp edges. M. Marinot delights in the effect of the marks left by the tool, and conserves a rare savour of originality, together with an impression of balance and reason. That is only one aspect of his work. The other consists of glass with intercalary decoration. In this, too, there is evidence of an astonishing fertility of invention. Dark cloudy masses or pale misty gleams appear in the body of the glass. Sometimes a clearly defined pattern is inscribed—a spiral of smoke or " waves "—or perhaps the glass is here and there suffused with sombre, smoky colours. Sometimes the decoration takes form in tongues of reddening flame, which is emphasised by engraving. Again, Maurice Marinot introduces bubbles into the body of the glass, of diverse shape, size and density—a decoration which at times permits every freedom to caprice, but at others is subject to the discipline of organised design, as when it ascends from the base to the lip of the vase in a network of lines brightening as they ascend.

Maurice Marinot increasingly tends towards broad, simple effects: the actual material of the shapes evolved by his extraordinary skill supplying the means. His æsthetic theory is clearly summed up in the declaration: " The more knowledge the glass-maker has of glass, the greater his freedom in the attainment of the results desired, and the more expressive of the material is the brightness and transparency of the shapes. In the chief part of every vessel there should be the appearance of swelling which is the characteristic evidence of blowing. It is this which best expresses the method by which the glass was formed, and which gives fullest effect to its brilliance with the varying sheen of light on its bulging sides. It is this, too, which gives the greatest value to its transparency, since the simple shape of blown glass is that which is most effective for the interplay of transparent surfaces. I consider that a fine piece of glass is that bearing the plainest evidence of the blowing which formed it, and that its shape should represent a moment in the life of the glass which has become fixed in the instant of cooling."

Designs executed by the corrosive action of hydrofluoric acid are not entirely new in principle, nor are intercalary decorations. What is new in Marinot's work is the unrivalled inspiration, imagination and invention, which reinvigorate the technique successfully employed by Rousseau, Léveillé, and later by the brothers Daum. Certain workshops, such as the Usines et Manufactures d'Art de Bezons, have recently exploited it. Another artist-decorator, Henri Navarre, who has, not without success, tried his hand at sculpture, goldsmith's work and stained glass, was about 1927 drawn to the art of glass-making. He began to produce massive pieces, stained with coloured pigments which describe great arabesques in the body of the glass. These usually consist of

spreckles, grouped with the required density, produced by finely powdered oxides of metals sprinkled on the "marver," on which the glass-maker rolls his molten glass. Henri Navarre designs straightforward solid shapes, which are easily recognisable, and impossible to confuse with the work of Maurice Marinot, to which they have a superficial resemblance.

An altogether different method is pursued by Jean Sala, the son and disciple of that fine glass-worker Dominique Sala. He has been called the specialist of "*malfin*" glass, in compliment to the simple, heavy ware which has an attractiveness similar to that of the common glassware of the ancients. This *malfin* glass, however, is an incompletely refined substance, still in the state of coarse, impure paste, with the troublesome drawback of becoming pervious to water within a comparatively short time. Jean Sala is averse to using this imperfect material. There are a considerable number of imitators of his work who produce a sham copy of it by employing semi-fused glass. His method, however, is to place between two "*paraisons*" a layer of bubbled glass, which shows through and imparts that solidity and body to the vessel which the artist desires. Jean Sala takes no risks with the transparency of his glass. He makes a kind of coloured paste, prepared and fired by himself. From this he fashions works full of naturalness and vigour: jars decorated with fruit, leaves or animals; bowls wreathed with vine leaves, beasts and often great fish, rendered with both spirit and realism. Yet Jean Sala follows the traditions of the ancient craft. With his own hands he gathers the glass on to his tube, blows it, and works it with the traditional tools: pontil rod, procello and shears. By this method he executed the centre-piece of sixty fish, no two alike, for Baron R. de Rothschild. That is representative of the individual style of Jean Sala, one of the last of the authentic glass-makers, that is, men who carry out their ideas personally, thereby adding to the beauty of the original conception the peculiar charm of rapid, inspired and spontaneous improvisation, for which practical knowledge is after all necessary.

A bowl by Lalique, encircled with a bevy of nymphs, a vase by Marinot, slashed with jagged incisions or a rare and barbaric ornament by Sala are each the expression of a personal æsthetic. In contrast to this conception of art, that of certain modernists—who apply all their efforts, researches and inventive powers to the creation of a formula of the impersonal, the objective and the impassive—is based on the use of geometrical ornament. Some exclude emotion as being a cause of error and muddle. Others avoid plastic form as being liable to go out of fashion. Others again reject the human form, because it is too subject to ephemeral contemporary taste. Alternation of transparent and opaque rectangles of elegant and novel proportions is in their view a design that lasts and is not affected by the passage of time. This at any rate is the conception of a modernist school who create objects as remarkable in themselves as they are instructive. Their only mistake is in thinking that any one epoch or man will achieve the absolute in beauty. It

is none the less interesting to record this orientation of art and general taste towards impersonal decoration.

That, in brief, is the doctrine of Jean Luce. The work of this young master is in one respect characteristic. He is a potter as well as a glass-maker, and a decorator, a creator of models, rather than a craftsman. He designs and invents, and his work owes its charm to the extreme elegance and originality of his style, without the treatment of the material contributing anything or even having any great importance. It is necessary to stress these points. They explain, too, the æsthetic theory evolved by decorators who are strangers to the technical side, whose designs are imposed on the craft, instead of arising out of it. In his choice of a design, Jean Luce shows an exceptionally strong sense of proportion. He has a remarkable gift of imparting value, dignity and freshness to light geometrical ornament, quite simple in itself, which he places exactly where it will "count" most. Jean Luce began by using enamel, but for several years now he has increasingly used purely geometrical decorations of ground glass, without figures or relief, applied to strong, simple shapes, often executed in tinted glass, such as light blue or steel grey.

Louis Vuitton is no more a glass-maker than Jean Luce. He, too, is a decorator, and his merit lies in having found a new source of inspiration for the art in the making of scent bottles. The idea is based on negro art. His queer, squat, bottles of cubic design were exhibited for the first time in 1929. Their facets are ornamented with parallel ribs, straight or curved, or with circles and ovals. Side by side with his productions, Louis Vuitton set examples of negro art—masks, fetiches and ornaments, of which the remote, hieratic conventionalisation he converted to his particular service.

Originally an enameller and decorator, Marcel Goupy approached glass-making in a semi-professional way. He was not satisfied with handing over his designs to the workmen. He personally superintended the firing operations, such knowledge providing him with new ideas. In 1925 he substituted for enamel a kind of glaze, made of vitrifiable colours. These, when mingled together while fusion is in progress, yield effects of marbling and iridescence which are extremely unusual and interesting.

The factory of Baccarat is faithful to the formulæ of its own traditional styles, and confines itself to the production of crystal, a substance which is, of course, constitutionally different from glass. There is no advantage in a crystal which is not perfectly fused, nor would the material benefit by the introduction of intercalary decoration, which would dim its brilliance. The Baccarat factory, therefore, dispenses with extraneous devices. It is content to produce an admirably pure, bright and luminous crystal, in shapes of generous size, perfectly polished, which exhibit its solid quality, and disdains the austere, prismatic designs which are so attractive to modern taste. Profiting by the lessons of recent experiment, it combines the simplicity now in vogue with a rather massive richness,

and so inspires that feeling of confidence necessary for success in a well-established society.

A factory which for almost two centuries has worked on the same lines as Baccarat is the Cristallerie de Saint Louis, who manufacture most of the ware sold in the Paris shops. Some unusual inventions may be placed to their credit: such as " flushed " dark crystal in several layers, engraved by Nicolas, a pupil of Gallé.

The Cristallerie de Nancy, founded comparatively recently, produces not only bottles, of which it has made a speciality, but also decorative pieces in a definitely modern style, with large facets cut in the " cabochon " style.

Flint glass, the discovery of which is due to Great Britain, seems to have improved considerably in quality since the seventeenth century, if we consider its present output in the light of the criticisms formulated in 1771 by Bosq d'Antic. English crystal is among the finest known. Whether uncoloured or tinted (like the buttercup-yellow crystal made by Stevens & Williams), it is characterised by sparkling purity, due to the perfection of the polishing. In his Report of the Paris Universal Exhibition of 1900, the Duc de Luynes remarked on this dual quality in British crystal. With equal justice he praised the skill of its cutting, by means of which full value was given to the transparency of the metal.

In this type of glass, there is no attempt at the rather facile effectiveness of sharp contrast between " leafy " engraving and " diamond " decoration. Nor is recourse had to the star pattern, which, although it adds to the sparkling effect of crystal, is based on a banal and impersonal æsthetic. This commonplace technique is avoided by Thomas Webb & Sons. Their cut-glass designs, far from multiplying the points of illumination, tend rather to accentuate the form itself. Their stemmed wineglass, for instance, has a series of superimposed " collars " like the spirals of a pillar, which give the base an impression of strength, while the opening out of the bowl, accentuated by vertical flutings reminiscent of a capital, counterbalances with its grace the sturdiness of the stem. A second and more massive example is encircled with a geometrical border, and yet a third has its entire surface cut into innumerable angles with quite dazzling effect.

Another variation of this style is the work of James Powell, which is more nearly related to that of the Continental artists and less specifically British. He allows the outline of the glass to retain all its clean simplicity, but decorates the surface, curved or flat, with patterns—figurines amusingly conventionalised, or broadly treated foliage—cut at judiciously calculated angles, so as to increase the brilliance and purity of the glass.

Belgium, in particular the Walloon factory of the Val St. Lambert, produces mainly cut crystal, and has brought this craft with patience and care to a high pitch of perfection. A remarkably vigorous effect is presented by their pieces of large dimensions, executed in thick crystal, and adorned with deep cut designs made by the wheel to a depth of

12 mm. The Val St. Lambert has very cleverly adapted the technique of cutting to that of "cased" glass, which the craftsmen of the French School in 1880 engraved with the small wheel. The core of plain crystal is enveloped in several tinted layers, of which the outermost is cut with the wheel by the Belgian artists into many faceted medallions. These are thrown up by the gleaming background like jewels in their setting. The originality of the Walloon factory is not confined to these interesting productions. Wheel engraving is practised with equal success. Antonin Daum was greatly impressed with the effect, previously unknown, to be obtained by shallow engraving, hardly distinguishable from the surface.

Cutting and engraving comprise the complete decorative technique of the traditional glass of Bohemia. It was practised in olden times by this nation of glass-makers, and is still held in honour. Although as regards technical methods and machinery the Czecho-slovakian engineers and craftsmen have produced inventions of great value to the national industry, the artists and designers have kept to the principles of decoration applied by their predecessors from the seventeenth century onwards. Not that Bohemia did not make the attempt, when the new fashions in crystal were endangering their supremacy, to produce flint glass in their turn with oxide of lead. The glass they made, justly renowned for its limpidity and durability, was soon rivalled if not surpassed in beauty by the English metal, and they were obliged to improve their standard. They tried, especially in Southern Bohemia, to make glass which would equal the quality of the English crystal. Some of the manufacturers developed the production of coloured glass.

It was an epoch of mechanical progress. The brothers Klein, of Treitsch in Moravia, Siemens, Venini, Platenka, and Lippert, each in their turn invented furnaces. In Bohemia experiments were made with sulphate of soda as a basis for fusing, and powdered granite for bottle-making. Frederic Egermann, of Blottendorf, invented his polishing process, and the Reich's their method of sand-blasting. Egermann in 1828 discovered "lithy-lines," an imitation of precious stones, in particular the agate. Joseph Strass invented artificial jewels. "Jewel" glass is made in many colours: from porcelain-white to turquoise-blue, from ruby-red to light blue, and from *Rose-Dubarry* to black. Wilhelm Kralik produced albastrine glass, Harrach his "*hyalithe*," and Franz Welz, in 1890, rose-coloured glass, by using selenium.

Conditions in manufacture were also changing. The little forest workshops built of wood disappeared one after the other, and factories equipped with machinery usurped their place. The use of the Siemens regenerative furnace led to the dispersion of the centres of production, and factories with coal furnaces—in general use in Bohemia proper—were installed in the coal-producing valleys. The Slovakian factories, faithful to the traditional fuel in default of good coal, established themselves in proximity to the

railways. Incidentally it may be remarked that the finest glass is that made over a wood fire. In Czechoslovakia to-day there are 146 glassworks, 29 glassworks supplying the glass, and 4,000 factories and home workshops where glass-cutting, engraving with tools or acids, enamelling and other decorative methods are carried on ; 30,000 glass-blowers are employed, 30,000 glass-workers, and 90,000 decorators at home. The factories which specialise in the production of blown and moulded glass number 106. Generally speaking, each glassworks has its own cutting department. The large glass-houses are organised for every process, producing the finished article. The industrial character of Czechoslovakian glassworks, and the division of labour and specialisation which has been established, is in strong contrast to the topographical organisation of the industry. Bor and Kamenny Sanov are the two centres of cutting and enamelling. Bor alone has 120 glass-cutting establishments. In the neighbourhood of these two towns are situated the Bohemian glass-houses. In Prague and the Sumava are plate-glassworks, and plate-glassworks are also established in the Sumava. In the district of Teplice there are also several glass-houses where blowing and moulding glass are concentrated. In a few Czechoslovakian factories the moulding is done by machinery. We will deal later with an important and curious product, which might be called national : the glass jewellery of Jablonec.

Technical progress to-day should be especially favourable to the emergence of great artists and creators of new forms and designs. Actually this does not always follow. Trained in the disciplined routine of the workshop, the best craftsmen remain brilliant executants. As to the designers of models, the architects and professors, nourished on modern æsthetic theory, they attempt to reconcile the powerful traditional formulæ of cut-glass with the present-day taste for straight lines and geometrical pattern. In a general way the typical glassware of Bohemia, whether produced by Yar Benda, Moser, Joh. Loetz or Lobmeyr, is deeply cut work, wonderfully clear and sharp, where on a core of clear glass as a foundation an outer layer of coloured glass is cut into patterns in high relief. Or else coloured glass itself may be the foundation, giving an effective background to other tints. The finest glass, however, is clear, cut in bold facets, with a glitter of such perfect quality that the eye can detect no flaw in its transparency, its purity accentuated by a few skilfully calculated gashes.

In this style are the glass designs of Josef Inwald, with bowls cut into the shape of tulips ; and of Professor Dorn (with the assistance of the works manager, Krause), which are cut with marvellous dexterity under his direction at the national technical school of Steinschönau ; and the figurines of animals, executed with a breadth of style worthy of the old Chinese lapidaries at the national technical school of Jablonec ; the presentation goblets, in the execution of which Emil Sprachte, of Prague, unites masterly cutting with disc engraving ; the vases which Professors Pfohl and Cizek, at the national

technical school of Bor-Haida, decorate with fine disc engraving surrounded by free, clear cutting. Engraving, in fact, is one of the most favoured methods of the Czecho-slovakian masters, as is further evidenced in the graceful work of the two clever crafts-men, Eiselt and Kromer, of Steinschönau, whose feathery decorations, enriched with enamels, are very modern : clusters of fruit, stylised foliage, polished geometrical reliefs on a frosted background, segmented circles, silhouettes and figurines—those, too, of the Bouisch works, at the school of Bor-Haida, in a more mannered and formal style, and similar work done at the school of Zelezny-Brod under the direction of Professor Juna. Two masters of great talent are Professors O. Zak and Ladislas Prenosyl, who successfully uphold the tradition of ancient Bohemian engraving at the school of Zelezny-Brod, while at Bor-Haida the glass-maker Joh. Oertel is a clever executant both of cutting combined with engraving, and excavating the nether layer of flushed glass by erosion.

The disruption of the old Austro-Hungarian Empire in 1919, by liberating ancient Bohemia, reduced the production of Austrian glassware to comparative unimportance. Most of the glass-houses and almost all the glass decorating works became Czecho-slovakian. Apart from the ancient firm of Lobmeyr, which still maintains its pre-war establishment at Vienna, only a few private concerns, notably the Bimini Werkstätte, remain to represent the art of Austrian glass to-day. The Wiener Werkstätte are mainly occupied with developing the experimental formulæ of the leaders of modern Viennese art theories.

To Lobmeyr are due some designs which excellently express the specific qualities of glass, and respond successfully to the circumstances of technique. Their great goblets of heavy glass are an example. These are very transparent, decorated with cut work of varying depth and profile, consisting of foliage, flowers and geometrical shapes, or else groups of human figures, treated with a variety of style, freedom and an instinct for adapting the decoration to the contour of the vessel which is altogether rare and remarkable. Messrs. Lobmeyr produce cut or engraved vases so skilfully formed, that they remind us of the lovely natural crystals of the Renaissance lapidaries. Or again, the form may be left unadorned in all the loveliness of absolute simplicity. The Viennese factory also executes cameo engraving, of which the layers detached by dexterous cutting owe their exceptional brightness to the perfection of the polishing, and, lastly, they work in enamel : a very rare black enamel, in designs of foliage and human figures, which are the favourite Lobmeyr decoration.

There are very few Italian artists who decorate glass in the modern spirit, or who have escaped from the domination of a glamorous but decaying past. Since 1900 the Salviati glassworks have been reviving with much acumen and technical dexterity the fifteenth and sixteenth century patterns which had fallen into disuse, and they have

profited by the increasing taste for the old models, but nevertheless a reconstruction movement has been plainly apparent for the past ten years. In the domain of table glass and electric light fittings, which we will deal with presently, it is very evident. In decorative work, mention should be made of the interesting productions of Guido and Anna Balsamo-Stella, of Florence, who engrave with ingeniously conventionalised mythological figures the graceful shapes executed to their own designs in the glassworks of Ferro Toso.

Barovier, of Murano, has invented the " *Primavera* " blown glass, but has also been engaged lately on decorative pieces enriched by splashes of deep-tinted glass. The imagination, together with the taste and distinction, displayed in these productions is not unpleasing. Lastly, the Venini works, although their production is mainly table glassware, are responsible for a variety of glass ornaments. The wonderful skill with " bubble " forms, so evident in the work of the Venetian masters, is displayed in these graceful toys with grace as well as assurance.

The glass-makers of Spain, the heirs of a long and glorious tradition, appear to be outside the " modern " influence, with its insistence on form and the consequent renouncement of ornament. They are concerned not so much with transforming ancient ideas as with extracting new ideas from them. José Gol, of Barcelona, preserves the old principles in the fanciful creations which he achieves by cooling and reheating and elaborates with flairs, indentures and chemical products pressed in by pincers. His work is influenced by the Venetians, and is a little heavy and coarse, like the old Spanish glass. But José Gol enriches it with his extremely lovely decorations in translucent enamels, which are fresh and brilliant and of a remarkably deep colour. Enamel is, of course, nothing more than powdered tinted glass, the application of which in greater or less thickness determines the depth of the colour. Great skill is necessary to avoid accidents during firing : poor colour, or distortion of the vase when heated to too strong a temperature, is always a grave risk. With José Gol there are a group of artists who follow the art of enamelling in a different spirit, recalling the flat, bold methods of poster design. Among the more noteworthy are Euda and Nurai Sole, Amelica Cardunets and Ricardo Crespo.

In this type of work the glass is not merely a neutral background. It has a special value and an important *rôle* in the production of the general effect of the whole, since on its quality depends the brilliance of the superimposed enamel. Enamel decoration, however, is foreign to glass itself, and it is on the treatment of the actual material that in Sweden all decoration is based.

At the end of the last century, Gunnar Wennerberg, an artist who resembled Gallé in his enterprise and his love of research, was experimenting in the art which the Lorraine master was then in process of reviving. He did not, however, win any disciples. The Swedish glass-makers had for two centuries been handing down from one to another the

fruits of their long experience, and the work of Wennerberg, which could have inspired them with new ideas, went unrecognised. Twenty years passed before the revival took place, and modern Swedish glass dates from 1917. In that year the consul Johan Ekman, of Göteborg, decided to reorganise the insignificant ink-bottle factory which he owned in Smaland in the depths of the forest. He entrusted the direction to two eminent artists, Simon Gate and Edvard Hald, who were painters and decorators, and soon the unimportant factory of Orrefors became, under their auspices, one of the most illustrious centres of the modern arts. The glass which was produced, known as " Graal," after the legend, is romantic in aspect, embellished with mysterious cloudy colours or figure decorations. It is made from a block to which the decoration is applied, and the elements subjected to the reducing action of the fire. Then, while still hot, the block is enclosed in a glass sleeve, and the glass-blower gives it its final shape. The Graal glass has sometimes been compared to the " flushed " glass of Emile Gallé. But the similarity is only apparent. Gallé's effects were obtained by using the grindstone on the outer casing so as to lay bare the layer beneath. This procedure is foreign to the art of the glass-maker. The Graal glass is executed entirely by fire. The pieces are complete when they are detached from the glass-blower's tube.

In addition to this technique, of which the successful specimens are exquisite, but rare—the colours often being of a regrettably dull equality of transparency—the Orrefors factory also practises intaglio engraving with the wheel, and this type of work forms the bulk of their production. The potash or soda glass prepared by their Sandvik glass-house is reserved for table glass, but for decorated glass the manufactory uses a very clear, transparent crystal supplied by their own furnaces, fired by wood, like those of Sandvik. Orrefors ignores the mass production methods—stamping while hot—of the American and a few of the Czechoslovakian glass-makers. They confine themselves to working with the tool. The engraver has before his eyes a pattern delineated on the glass. He reproduces it on the glass by means of an adhesive ink, which only requires engraving. For this the operator is provided with a simple but very numerous set of tools : a lathe, to which a copper disc is adjusted, selected from the odd hundred which form his arsenal, ranging in diameter from 1½ mm. to 200 mm. Charged with the classic mixture of oil and emery powder, the disc cuts the crystal according to Simon Gate's designs, which revive with considerable instinct for style the tradition of the Renaissance, and those of Edvard Hald, which are full of witty imagination and grace. The metal disc revolves in a circle, and therefore produces rounded effects, so that it is the tool which dictates the form and leads to the choice of curved motifs, such as the nude female form—a muscular and vigorous type, like Michelangelo's goddesses. An optical illusion causes the most deeply hollowed parts to appear the most prominent. The vessel, in fact, acts as a background which increases in brightness as the thickness of certain parts is diminished. The

most prominent parts of the figure, therefore—shoulders, breasts and thighs—are the most deeply hollowed.

The Orrefors production is not entirely limited to this style. Cutting is also practised, but not the deep gashes with facets and diamonds which arrived from America about 1900. Gate and Hald adopted a simpler style, better suited to the material, and, more appropriate to the expression of its limpid quality—the "olive" method of cutting; or shallow-cut geometrical relief, similar to the British and French work of the end of the eighteenth century. The Swedish artists, too, consider clear crystal a little uninteresting. For ordinary table glass, which will be described later, they tint their glass with light and charming tones of sepia or pale violet.

The reorganisation of Orrefors was not carried out without strongly affecting other manufactories, which, under the designation of the Swedish Crystal Glass Works (Svenska Kristallglasbrucken), formed themselves into a syndicate. Notable among these is the *doyen* of the national factories, Kosta, founded in 1741, under the direction of Ewald Dahlskog, who was succeeded by Reijmyre, then Elme, whose manager, Edwin Ollers, is a clever decorator, full of ideas, and finally Eda. It was Edwin Ollers who, about 1917, made pieces of green grass sprinkled with bubbles, a form of decoration revived by Maurice Marinot. The green crystal itself is highly valued. The vase, one metre in height, presented to the city of Stockholm on the occasion of the opening of the Town Hall in 1923 by the rest of the Swedish towns, is executed in this beautiful sea-green glass. A spirit of enterprise and initiative arose throughout the country, where the national taste is characterised by restraint, proportion and distinction. In 1923 a competition was held for artists who were designers of glass, and the results were displayed at the Centenary Exhibition at Göteberg. Numerous new men took part. Having gained their experience at first hand, after the example of Orrefors, they nevertheless demonstrated that they were independent of the usual technique of that notable establishment. The compositions of the young Swedish crystal designers are inspired by the syncopated style, in which only part of the subject is represented; imagination must supply the rest, or else an impression is suggested of instantaneous movement: the syncopated style of the experimentalists of yesterday—Georges Braque, Juan Gris and André Mare. Others are more traditional, and are content with a simplified matt design detached against a transparent ground: a running dog, a woman's profile, or a garland. We have here the beginnings of a style which is striving to recover the freshness and naïveté of past ages.

It will be seen that Germany makes an important contribution to the production of utilitarian glass for light fittings and architecture. But in decorative glass she has not much to offer. Mention should be made, however, of the cut crystal of Professor von Eiff, of the Kunstgewerbeschule at Stuttgart, which is executed with great accuracy, in

accordance with the neo-classic canon : the motifs projecting on the clear surface of the glass, as has been common in German decoration for the last twenty years. Nor should we pass over the figurines of coloured brown glass, deliberately distorted to form amusing caricatures, of the manufactory of Thuringia, especially by the two designers, F. Greiner and Müller-Bauer.

Germany is not alone in creating amusing ornaments : Messrs. J. J. Walsh, in England, produce a whole community of animals in opaque white blown glass, which are very effective. In Venice, Messrs. Cappelin make moon-fish, shell-fish and sword-fish, together with Turks and dancing girls which are as fine in quality as they are ingenious. In Czeschoslovakia, the national technical school of Jablonec, and Jaroslav Brychta, of the Zelezny-Brod school, show strong feeling for silhouette in their witty figurines of blown glass.

In this art, however, which is both imaginative and sensitive, the chief exponents are the Austrians Berger and Lampl of the Viennese factory of Bimini. To their keen sense of movement and thorough understanding of the nature of glass are due the deliciously airy figurines : fencers, dancers, and ski-runners—plain bulbs of glass, modelled by the tool with infallible dexterity and thus achieving a perfect effect.

The American factories have for a long time absented themselves from our Exhibitions in the Old Continent. It is difficult, therefore, to estimate their development, but it seems to follow the lines of modernism, combined with a taste for ornament. The styles popularised by the Paris Exhibition of 1925 appear in the engraved crystal made by the Steuben Glass Works, and on the geometrically shaped boxes and vases in black and gold of the Fostoria Glass Company. From the technical point of view, these are of excellent workmanship, and many examples of cut pattern in crystal by American factories are comparable in the breadth and purity of their style to the rock crystals carved by the ancient Chinese.

# III. ORNAMENTAL AND TABLE GLASS

THE difference between two distinct formulæ—one adapted to the properties of glass and the other to those of crystal—is even more strongly marked in glass of everyday use—tableware, toilet ware, flower vases and other objects—than in purely decorative glass. There is a striking contrast between the glasses of Orrefors, Venice and France, which are like smooth, clear bulbs, and the cut crystal of England, with its massive opulence. Two entirely different conceptions of table glass design are expressed in the two styles, which are both founded on tradition, and equally perfect in the logic of their design and execution. The English glass, of course, not only has a tradition of bourgeois luxury, all the stronger as bearing testimony to the cult of the hand-made, but an authentic and incontestable richness entirely its own. The table glass of Messrs. J. J. Walsh, of Birmingham, has a truly sumptuous character, due to the skill in cutting, which still further enhances the natural beauty of the luminous crystal. The shapes do not pretend to great originality; they adequately satisfy the mind and eye, and their rational and dignified form consorts well with the decoration, which is at once exquisite and unemotional. Their principal merit lies in the confidence of impeccable technique. The lids of the covered bowls—sugar basins, powder boxes, jam jars and pots for cosmetics—fit so perfectly that the vessels are hermetically closed; the cabochon decorations and the bevelled facets reveal infallible geometrical accuracy. They form the culmination of this style of crystal. Messrs. Walsh are nevertheless not indifferent to the change in public taste. In order to comply with it they have designed wineglasses with generous bowls well set on short stems, goblets with their surface cut into flutes, to ensure a better grip. Of these an especially interesting example is made with a rectangular base, a solid, transparent little pedestal, which gives the silhouette an appearance of equilibrium and steadiness as well as of dignity. Lastly, yielding to the vogue for colour, this glassworks has evolved quite another class of production, simple in design, expressive of the blowing with its swelling curves, and free of all decoration. Neither engraving nor cutting is allowed to detract from the transparency of these bulbs of amber and blue, which are made into bowls, wineglasses, decanters and urns. Just occasionally an ornament is modelled and applied during the blowing process in the Venetian manner, as an enrichment to the form. But the Walsh crystal, in complying with a fashion which is universal and not specifically British, has, it must be confessed, forfeited something of the originality which marked the national style.

The general tendency of utilitarian crystal lies in another direction. Outside Great Britain, the scintillation of cut glass is no longer popular. On the one hand, greater importance is attached to the actual quality of the metal, which is all the more in evidence

the less there is of ornament to distract attention, and, on the other, the bubble-like fragility which up to the present has been the peculiar property of glass alone. To-day these two materials are no longer shaped in accordance with their separate characters. They imitate each other, or rather they have parallel tendencies towards the same style, dignified, gently graduated and bare, with a studied restraint. Certain changes, too, are introduced into the metal itself in order to facilitate the mingling of styles. Many glass-works add oxide of lead to their glass, or potash, or soda. Theirs is a demi-crystal, which is denser, harder, brighter and more sonorous, and which it is only reasonable to treat otherwise than glass, with its oily, plastic nature.

Certain factories, of course, still adhere to the traditional method of cabochon cutting—for instance, the Val St. Lambert works in Belgium, which is noted for its skilful and accurate work, and the Czerny works of Warsaw, where cut-glass vases are produced with matchless skill, decorated either with cabochons or grooves in the form of scintillating stars or foliage. The Lobmeyrs themselves, of Vienna, are not averse to cutting deep grooves in their scent-bottles, jewel trays and tableware. This illustrious firm, however, is more concerned with the direct processes of production, notably " cased " glassware.

Certain square-cut bottles, enclosing within thick, transparent walls a small hollow destined for some rare essence, are executed by this effective process. The covered bowls, each formed of the two halves of a sphere, with their rims perfectly fitting together, as in a ciborium, are proof of the technical mastery of this old-established factory. To this remarkable skill is added great ability in producing graceful designs. The creators of vessels embossed with cunningly devised disorder are also the authors of some of the purest designs known to the art of modern glass. These are characterised by a natural grace of movement and frank acceptation of function. The base is broad in diameter, the stem tall and slender without being attenuated, the bowl wide, light and ample, of proper capacity and proportions. Ringed with enamel, such a vase seems almost as if it would become strangled at the neck, but will all the better grip the stalks of the flowers for which it is intended.

Among the various productions of the Viennese works, it is pleasing to come upon a unique form of design : the vase supported on an inverted cup. Lobmyer strikes the balance so well between the two bell shapes, joined at the neck, that there is no possibility of mistaking their purpose. That is the distinguishing feature of the design. Originality in art is always to be recognised by the just proportions of the design. The imitator goes too far, as he does not copy the thing itself, but an outside interpretation of it. In developing, he alters it, and makes his own additions. Thus, when they make use of the idea of a cup resting on an inverted bell, the Wiener Werkstätte's work results in a heaviness which is in strong contrast to the grace of Lobmeyr. In all the productions

of the Wiener Werkstätte may be observed this rather laborious and academic character, which is the result of all production based on a style rather than on the art itself. It is technically perfect, but lacks feeling and spontaneity. It is theoretical and applied, like prize-winning efforts of clever students. Inspired by distinguished artists, who, as in Germany, supply ideas for decoration, but are not themselves craftsmen, they have direct recourse to the canons of the so-called modern æsthetic. The Wiener Werkstätte, although they have a successful design consisting of vertically cut parallel lines, unequal in length, arranged to form triangles, which emphasise the lines of the cup, prefer geometrical compositions, free of all dramatic or figurative significance. These are applied by engraving or enamel.

The Tyrolese Glashutte are less restrained in style, and equally open to modern artistic influences. While they exercise to the full their skill in the application of the traditional formulæ of enamelled, engraved or cut glass decoration, this glass factory aims at creating new designs by enlivening the undulating surface of the glass with stripes of coloured enamel—circles, waves and spirals in shades of lilac, coral or blue. The possibilities of this type of decoration are rather restricted. The Bimini Werkstätte are bolder in conception, and are the creators of the witty and charming figurines of blown glass, whose merits have already been referred to. They have also invented some very pleasant designs for table glass, enamelled with fine white lines arranged in spirals, parallels or net patterns. Some of these, gourd shaped, with short spouts, are particularly successful. Mention should also be made of the vases of Oswald Haerdtl, the architect, executed by Bakalowitz of Vienna, on account of their intercalary decoration: a large violet-coloured spiral.

In the Bimini work may be recognised certain reminiscences, and legitimate ones, of the Venetian *latticini*. Venetian influence, in fact, is far from extinct in glass-making countries. Even Germany, absorbed as she is in her artistic rationalism, is not free from a slight tendency to Murano mannerisms. The Hellerau works make bell-shaped flower vases of blown glass, set on highly inflated globular bases, whose origin is beyond all doubt. The iced-water pitchers and beer jugs from the Theresienthal and Regenhütte works bear no traces in their undulating, luminous glass, of the " geometrical " æsthetic, which seems to be exploited in Germany far more by the designers than by the craftsmen. It is from a technical school, the Fachschule Zwiesel in Bavaria, that we get the typical examples of the modern style. Sometimes the decorator limits himself to encircling the graceful spindle-tapering curves of his vase with a fine double thread; sometimes he affirms the upward sweep by vertical cuts, closely set. Again, he decorates the swell of the vase with an ingenious powder pattern of leaf forms, cut with the wheel, or with beads of enamel, which have no special design or actual purpose but simply flatter the eye. In some cases, the enamel spots produce a kind of expressionism, by means of

those syncopated and mobile reflections which any crystal vessel so effectively creates.

It is noteworthy that Holland, so venturesome in architecture and furniture, is traditional in the treatment of glass. The globular shapes, capacious and strong, supported on high stems, offer nothing that is unusual. There is a feeling of massiveness, steadiness and firm balance revealed in the production of Leerdam, the great Dutch glass manufactory. The Leerdam designers do not hesitate to set the bowl of a wineglass or the half sphere of a bowl on an octagonal base, depending for its dignified effect on correct proportion, or on a thick cylindrical foot, which is quite a successful combination and not without nobility. For large flower vases cut-glass is also used, the decoration taking the form of great, boldly executed squares.

On the other hand, the magnificence of the products of Czechoslovakia is only displayed in decorative pieces. The ordinary glassware is not characteristic. The shapes are always good ; those executed in crystal, tinted with sepia by Professor Ladislav Sutnar, of Prague ; in uncoloured blown crystal by the Metelack works, at the school of Zelezny-Brod ; in cut crystal by Messrs. Rückl, of Mizbor ; and by Josef Gerner, of Bor-Haida, being by no means negligible. The glass sets executed in clear crystal by the Moser works, rectangular in shape with square stoppers, are proof of a thorough comprehension of the possibilities of the material.

Italy, of which the Venetian glassworks of Venini are typical, is even more opposed to the angular style. In the ordinary glassware, as in the purely decorative work, ancient models are resuscitated by transforming the cylindrical shapes of glasses and decanters into prisms. Care is always taken to round off the corners formed at the meeting of planes. Lines are always curved in Venini productions : gentle, and not over exaggerated.

The Northern lands, which one would imagine to be susceptible to a voluntarily abstract æsthetic, have not succumbed to it. Though it would be rash to assert that the genius of Venice still exercises its century-old prestige, there are, none the less, traces of Venetian influence in the originals of the graceful, delicate glass of Holmegaards Glasvaerk, the principal Danish factory, as is shown by their predilection for curvilinear forms and elaborate profiles. A conspicuous feature of the Holmegaards designs is the importance of the glass stopper. This reveals another influence—that of Russian art. The Northern craftsmen adopted the graceful lines of Russian architecture and decoration, which are to be found, too, in specifically Swedish designs.

The archaic style, the " Etruscan," which is supposed to have been first introduced into Sweden from France about 1775, appeared there not at the close of the eighteenth century, but during the seventeenth, since Sweden began to imitate Palladio a hundred years before France. The imprint of this disciplined, learned and sober art affected Swedish taste—naturally good and pure—very strongly. The style was developed with

considerable grace in ordinary tableware. Thus the Orrefors factory, far from limiting itself to the decorative productions of Edvard Hald and Simon Gate, manufactures quantities of inexpensive glassware. Mr. Erik Wettergren, the learned Honorary Keeper of the Museum of Applied Art in Stockholm, has described the rare quality of these soda glasses in the following terms : " In general, their beauty wholly depends on the form, which is simple and full of expression, and on the colours. Some are coloured deep sea-green, some golden-brown, some smoke-clouded, and by this means is avoided, without the aid of artifice, the excessive plainness which is a danger in cheap glass. For the sake of greater variety, they occasionally use a *moiré* effect known as *optique* in the trade. It is induced by putting the soft glass into a grooved mould, the marks of which partially disappear when it is blown, leaving a slight wavy effect." The first soda glass, tinted sepia, pastel-blue and grey, came from Sandvik, an annexe of the Orrefors factory, and most of the Swedish glassworks followed their example. Coloured table glass is very popular in Sweden. They have there a charming fashion of glass and china to match the colour of the flowers on the table.

The idea of uniformity in table decoration has also become the fashion in France. It made a first brief appearance as early as 1900, when Edouard Lachenal hit on the idea of decorating both his glass and his china with sprays of lily-of-the-valley. Twenty years later, this idea inspired some of the cleverest of the French designers. Jean Luce and Marcel Goupy, in particular, have adopted it as a system. The method of the former is to decorate plain white porcelain and plain glasses with an identical design, conventionalised, very decided and geometrical—a monogram, linear pattern or some other simple motif—which his keen sense for effect makes interesting. Marcel Goupy has greater variety of ideas, which are in a sense more personal. His plates have a plain silver border, which is matched by a similar border on the glasses. If he has a dog-tooth pattern on the plates, the glasses will take the shape of two alternating, unequal cones. Should the china be decorated with concentric circles, the glasses will have the same motif, presenting in profile a series of even undulations, and the fluting on the silver will be yet another interpretation of the same theme. Consistency in table decoration was also the ideal of Georges Rouard, President of the Chambre Syndicale de la Céramique et de la Verrerie. He himself designed models of clear and sepia-tinted glasses, of which the just proportions and functional perfection are a credit to his talent.

Without being strikingly original, André Hunnebelle's designs recommend themselves both by their pleasant, easy style and their good lines. The proportions of his globe-shaped decanters and glasses are calculated with mathematical exactitude. He has some clever inventions also to his credit : the port-wine decanter, for instance, of which the axis is aslant instead of vertical, so that the handle is placed at the top instead of at the side. Daum has not produced very much table glass, but, nevertheless, he has not

been able to ignore it completely. He approaches it with a traditionalism which respects established canons. As we have seen, the factory of Nancy is developing in other directions. Baccarat divide their efforts, as regards decorative work, between the prismatic forms—the possibilities of which have been nearly exhausted in modern art—and a broad, smooth style which is reminiscent of the work of the Chinese lapidaries, but their table crystal none the less reflects contemporary taste for an individual style.

Not long ago it was the detail of ornament which differentiated the various models of production. There would be the engraved lace pattern, daisy pattern, Greek, intertwining, and a foliage pattern. The shapes, however, did not vary. To-day it is the shapes which change, and from this arises the necessity for more active invention. The old Lorraine factory has evolved some particularly attractive shapes. One of the best, set on a roughened base, seems to emerge gracefully from the rugged material, like a diamond from the matrix. This is a charming fancy, carried out with discretion. The crystal works of Choisy-le-Roi, ancient rivals of Baccarat, specialise to-day in the manufacture of electric light bulbs. They nevertheless maintain a cut-glass department, and produce table crystal of a high standard. To the same general description belongs the excellent crystal executed by Louis Sûe and André Mare during the period of their collaboration. The cut-glass decoration of the body and neck, the facets made with spirit and boldness, and very brilliant, provide a contrast, yet remain united, with the gentler gleam of the bowl.

The strong personality of René Lalique is not affected by transient fashions. The master adheres to his faith in the purely French conception of design, which does not confuse geometrical pattern with art, nor plain surfaces with style. The curves of his glass and decanters are often decorated with a light engraved pattern : it may be a powder pattern of ears of corn or daisies, wavelets or a flight of storks with fan-like outspread wings. As regards form, he keeps to the tradition. It is rational and well-proportioned, depending for its ethereal effect entirely on the delicacy of the ornament.

René Lalique has proved his wonderful fertility of invention in another, and no less important, department of glassware : the scent bottle. " His first scent bottles," observes M. René Chavance, " coincided with the adoption of luxurious methods of presentation by the perfumery manufacturers, and this contributed to the establishment of a standard size." The production of scent bottles is, in fact, a modern idea. Even in the eighteenth century—a period of extravagance in toilet accessories—the precious essences had no better container than a commonplace cylindrical bottle : these were known as " *rouleaux*." The Baccarat cut-glass bottles were alone in the field, until the renaissance inaugurated by Emile Gallé, or rather until the arrival of René Lalique's creations. The master's delicate taste was expressed in a great range of charming ideas. The actual material he used was especially well suited to the purpose. Crystal is, as a

matter of fact, too hard and dense to lend itself easily to the fashioning of scent bottles. Demi-crystal is preferable, and, above all, a metal which is completely free from coloration and clarified by strong heat. Crystal requires, after its removal from the mould, a long and costly process of cutting and polishing, but with glass, an infinitely more ductile and plastic substance, it is only necessary to "coax" it in order to correct imperfections.

Bottle-making has naturally followed the evolutions of modern decorative style. A product of fashion, it has adapted itself, in the hands of M. Louis Vuitton, to the vogue for negro art. It has donned austerely cubic forms. The ambitious heaviness of super-simple design has not imposed itself on the boudoir, since women prefer the imaginative treatment of the flask as an ingenious but practical accessory. Flasks are made in every conceivable shape: diminutive or corpulent, flat or round, stumpy or slender. Some are like bubbles, some like cubes, and the stoppers provide a complete repertory of decoration. Among the most original modern bottles, it will be enough to mention those of André Mare, some of cut crystal, at once massive and exquisitely made, others of smooth glass in romantically conceived shapes; those of André Groult, in opaline glass, with clever enamel decoration—in their studied simplicity not unlike the old chemists' jars; those of Senac, cut into prisms which look like natural crystals, bristling with angles conveniently placed to ensure a firm grip. In these innumerable designs the decoration is usually restrained: an elementary geometrical figure, a monogram or emblem. Sometimes a touch of colour is introduced, not by the application of enamel, but by a much quicker and more mechanical process. The bottle is coated with ordinary oil paint, certain parts of the surface being left unpolished. Then it is rubbed vigorously. The rubbing cleans the polished areas, but the colour adheres closely to the rough parts. If it is well done, this easy and inexpensive method results in pleasing effects. Lalique himself has deigned to employ it. Nothing less than the good taste of a master, however, is necessary, so grave are its drawbacks—especially the dull and lifeless appearance of the solid colouring imposed on a transparent substance.

# IV. PASTES OF GLASS AND OF ENAMEL

As has been seen, the method first employed by René Lalique when he was experimenting in the making of glass consisted of melting the crushed "cullet" in moulds of fireclay. This in principle is the whole technique of the mysterious production known as glass paste. It was certainly known to the ancient world, but for many centuries its secret was lost. How, then, did it come about that Lalique, a beginner in glass-making, employed methods which were unknown both to the industry and to other artists—Gallé, Rousseau, Broccard and Appert? Previously, only one investigator had explored the possibilities—Henry Cros, a man of keen and enterprising intelligence. Henry Cros was a pupil of Etex, and started his career as a sculptor. He was also a painter, and aimed at combining both media by modelling in coloured wax as they did in the sixteenth century. Then he took up encaustic decoration with considerable success—the process of the Pompeian frescos—and executed painted terra-cottas, an example of which, the head of a gypsy, is preserved in the Sèvres Museum. His ideas were evidently directed to discovering a plastic substance which could be used for polychrome sculpture, of which he had found ancient examples at the Louvre. Plastic glass, therefore, must have been familiar to antiquity, and Henry Cros set to work to discover the lost secret. He studied mineralogy, consulted chemistry and made numerous experiments. Like Palissy, he built a brick oven with his own hands at his home in the Rue du Regard. For a considerable time he only produced shapeless, though instructive, results, but finally he succeeded in creating those minute medallions which are nowadays sought by famous collectors. In 1891, Henry Roujon, Director of the Beaux Arts, arranged for a furnace to be allotted him at the Sèvres factory, together with a grant. Cros then executed his great decorative pieces: *l'Histoire de l'Eau* in 1893, now in the Luxembourg; *l'Histoire du Feu* in 1900, now in the Musée des Arts Décoratifs; and in 1903 the *Apothéose de Victor Hugo*, which adorns the hall of the poet's house in Paris. He was completing the chimney-piece *Légende du Feu* for the Château de Grosbois, seat of the Prince de Wagram, when death overtook him in 1907.

Delicate charm and a profound understanding of the decorative treatment proper to the rare and lovely material lend additional power to the pure and discreetly restrained (and therefore essentially decorative) style of these masterpieces. Jules Henrivaux in 1900 considered them "one of the finest discoveries he had known in the art of glass." It is rather surprising that to-day there is almost complete silence on the subject of Henry Cros's important contribution, though the most informed glass-makers are unanimous in their admiration for his work, with its solid yet transparent substance and its difficult

technique. The process, briefly described, consists in placing in a hollow mould of refractory clay a mixture in a soft pasty condition—made from an original model of wax or plaster—a sort of "*barbotine*" of powdered glass, mixed with a proportion of oxide and diluted with a fusion mixture. This paste is allowed to dry for a time. Then it is taken, either uncovered, like fragile porcelain (with which it has close affinities), or in its mould, to the muffle furnace which fuses it into glass. The mould of fireclay falls away in powder, and the baked shape is ready to be polished or merely wiped clean.

The difficulty of working the paste is, however, as great as that of its composition. Henry Cros declined to answer questions on this subject. The only information he would supply to the magazine *L'Art et les Artistes*, when they were preparing an account of his work, was that he used "uncoloured powders made from blocks of glass produced in crucibles." It seemed, therefore, that the substance had already been subjected to the action of fire. Antonin Daum, who, with every reason, greatly admired Henry Cros, thought that a definition like this was calculated to lessen the merit of the production in the minds of the public. "It makes it appear extremely simple," he says, "and as if the artist could give free rein to his idea. But between theory and practice there is a great gulf. Glass, with its strange physical properties, its restricted form of fusion, its poor conductibility, does not easily accommodate itself to the mould in which it is to be fired. It may run over it or burst it. If the fire is too hot it changes consistency or boils over. With less heat it goes powdery and does not melt. Everything has to be regulated: first the composition of the glass, then the best clay for the mould (this has to be adapted to the varying quality of the glass mixture, which changes with every different colouring agent which is added to it), and finally the special degree of heat required for each case. It might be thought that scientific methods and apparatus would make it possible to solve each and all of these problems. It is for the manufacturers to study the question. The artist is not concerned with practical details; he needs the spur to imagination which lies in the unforeseen result and the endurance of disappointment. In this he finds his reward. Of the present-day Palissys who have worked out their own methods in loneliness and anxiety, more than one has made his first attempt in a domestic oven." The concluding words of this appreciation are clearly an allusion to Henry Cros.

He won no disciples, with the exception of his son, Jean Cros, who completed the Grosbois chimney-piece in 1907. Up till 1914, Jean Cros executed masks after Rodin and Bourdelle. These had followed on a very fine series of Provençal landscapes in low relief after the manner of the former master. Since 1919 he has devoted special efforts to the improvement of lighting, and makes jewel-like plaques for hanging and wall lamps. Neither Georges Despret nor Décorchemont followed in the footsteps of Henry Cros. In 1889 Georges Despret had begun the experiments whose success was enthusiastically mentioned in 1900 by Roger Milès. He developed them to great effect, working

with a dense, almost opaque, but yet richly coloured paste which produced beautiful results, like cornelian, sardonyx or tourmaline, discreetly engraved by the lapidary.

François Décorchemont did not start until after 1900. His first works are executed in a fine but opaque substance, which is lovely, although at first glance rather grey and dull. The secret of transparent paste was to be revealed to him much later. The earliest pieces were produced in two separate operations. First the coloured *barbotine* was stamped into the mould, and allowed to dry sufficiently to be removed from it. He then finished the shaping, as in pottery work, and placed it in the muffle. He early recognised the importance of personally preparing the material. From 1904 on he made his own glass, and pounded it up for the next stage. He no longer removed the pieces from the mould, but put them both straight into the furnace—an important improvement. It was only towards 1920, however, after his return from the war, that he discovered the formula for that hard, translucent substance, from which for nearly ten years past he has formed the powerful masterpieces so highly praised by Antonin Daum (Recorder of the Glass Section at the 1925 Exhibition), for their " style, their form and their sober magnificence." They are composed of crystal, in which oxide colouring agents are combined with silica in entirely new proportions. The artist places the vessel with his own hands in the deep mould, moulded on the plaster model, a gauge being used to regulate the thickness of the sides. Then the paste is baked for a matter of twenty hours in its refractory casing, in an oil furnace invented by Décorchemont on the same principle as an oil lamp. It is allowed to cool slowly when the heat is diminished, and then extracted from the mould, when it is ready for the polishing of the parts which are to be bright against a dull background. That is the *modus operandi*, leaving out of account all the many complications and difficulties, which may be left to the imagination.

The choice of form is closely allied to the selection of colours, which are, it should be remembered, metallic oxides, each behaving in a different way under the action of heat. Certain shapes are impracticable in conjunction with certain colours. The irresistible movement of the molecules in search of stability cannot be opposed by the most infinitesimal resistance without causing fractures, produced at the moment of stabilisation—that is, of cooling. Another complication is that at the high temperature attained by the fire, certain oxides decompose, and others become volatile, with unexpected results. Even in polishing, difficulties may arise. It may happen that during the baking the metal changes its consistency. The friction set up by the grindstone causes heat, that is to say, a violent movement of undulation, and this causes molecules in the metal to expand differently, and sudden cleavage occurs. On the other hand, the presence in an unstable mass of a fixed element may succeed in stabilising it. François Décorchemont is to-day complete master of the difficult technique of the glass-potter. He produces pieces of a volume and thickness which had not previously been thought practicable,

and the noble simplicity and calm power of the designs associated with his beautiful translucent pastes—sea-green, amethyst or corundum—are like architecture constructed of precious stones.

The work of Albert Dammouse, which dates from 1898, is basically different. Actually, it is an enamel paste and not glass, as employed by the other artist. What he makes is really a soft porcelain, extremely delicate and diaphanous, with the enamel set between minute casings made of harder enamel. There is only a slight difference between this technique and that of the enameller, as once practised by Thesmar, and to-day by Heiligenstein. That is to say, he transformed, and improved upon, the ancient and curious craft of the glass-workers of Nevers.

This fascinating art of glass " cane " work has recently been revived. Louis Süe and André Mare have made, for use in table decoration, wonderful baskets of flowers, partly of solid glass, partly of glass canes. Mdlle. Mollenhauer and Léon Zak have also made some striking and amusing ornaments. The Atelier Primavera have produced decorative aquariums, in which live Japanese fish swim in and out of glass rocks among other fish, which are no less strange, but made of glass.

Mention should be made at this stage of the charming inventions for women's fashions: the amazing variety of bracelets, necklaces, handbags, and pochettes in coloured glass beads as varied as they are unusual, made in the most exquisite shades. Feathers and other ornaments are also made of bright supple threads of drawn glass. Marguerite Lehucher designs curtains and blinds charmingly decorated with cut-glass beads in softly gleaming patterns.

Distinguished artists have not disdained to take part in this delightful form of art. To one of them, the Catalonian master, José Maria Gol, we are indebted for some beautiful glass pastes suitable for making ornaments. In this field Germany has devised equally interesting styles—for instance, the original designs of Marianne von Allesch, the Berlin artist-decorator. In Czechoslovakia, of course, glass jewellery is a very important industry. Eighty factories and 4,000 workmen are engaged in making beads in the province of Jablonec alone, fifty factories and 6,000 men in making glass bangles and buckles.

Beads are differentiated according to the method of manufacture: cut, blown or moulded. The first are made by machinery into glass tubes, then cut, polished and refired—the last operation giving them brilliance, and being done at home. The blown glass beads are made on a reed: thirty or forty are made at a time, silvered, and then cut. The moulded beads are only partially polished, and form but a small part of the total production. Bangles are usually " drawn out " from a cylinder of glass, and then nipped off. They are cut, then refired, enamelled and decorated with incrustations. Another method is to bend rods of coloured glass round a cylinder while hot. At

Jablonec, too, are manufactured the ordinary pastes used in fancy jewellery. As for the beautiful and finely cut imitation jewellery in imported glass, the tradition is maintained by the lapidaries of the district of Turnov. Tiaras, bracelets and necklaces for elegant Parisiennes come from Jablonec. There are few industrial districts with such practical organisation and so well informed and enterprising an agency for obtaining information.

In a domain which has been little explored by artists, a Frenchman, M. Lepage-Gayot of Chaumont, has developed an interesting speciality. He makes funeral wreaths of glass bead work, dignified in design and harmonious in colour, which greatly excel the ordinary manufactured product and attain an artistic level—an illustration of the truism that art is primarily a piece of work well done.

# V. GLASS IN ILLUMINATION AND LIGHT FITTINGS

Of the three types of light fittings, two are excluded from our survey. These are decorative fittings in metal—bronze, forged steel, polished copper—and the indirect lighting system in which the ceiling acts as a reflector. We are solely concerned with the fitting made entirely of glass, or of which glass is the principal component of construction and decoration : the fitting composed of unpolished plaques, which diffuses the rays of light in the same way as did the classical lustres with crystal pendants and prism darts or drops, which are still made with continued success by the Baccarat factory in France, J. J. Walsh in England, Harrach in Czechoslovakia and J. & L. Lobmeyr in Austria. The peculiar, quivering play of the light reflected in the crystal prisms splits up the light without diminishing its intensity, producing also a mass of brilliance which has a distinctly decorative value. This is in the tradition of the eighteenth century and the Empire period. Certain glass-makers in France have attempted to revive it, by producing it at a period when the antiquarians were discouraging the evolution of original styles, that is to say, about 1840, in the time of Louis-Philippe. This was the intention of Louis Süe and André Mare, the designers of lustres in which the glass beads were arranged in the form of feathers and plumes, to preside over the daises and " imperials " of state beds. They too are responsible for the torches, with lamps veiled by cascades of beads in imitation of fountains, and also for the sconces and table lamps with shades constructed of large beads. This was a singularly interesting departure, carried out with both skill and talent. Emile Ruhlmann took part in the movement, expressing the same idea in a style entirely his own, as in his wall fittings, where the bulbs are masked with a double curtain of beads, and his table lamps, with triple branches rising vertically beneath a dome of beads. A number of decorators designed similar lamps about the year 1925. At the Exhibition of the Arts Décoratifs, Jonny et Leverrier, especially, displayed a particularly successful lustre. Of very simple design, it enclosed the whole of the lighting apparatus in a large bowl, surmounted by a spacious cylinder composed of small beads : the light it shed was exquisite. Georges Chevalier, on the other hand, produced some very successful hanging lamps in the form of spheres, bowls or curtains, using not round beads, but cut crystal cabochons by Baccarat, in order to obtain brighter illumination. To the same artist is due the charming design, likewise executed by the great Lorraine factory, of a lustre whose lamps, disposed in four clusters, are crowned by bead shades resembling fountains.

Glass constitutes a decorative element in space, without being part of the construction. Added to the lighting apparatus, it provides the artistic interest. In another type of fitting the glass assumes two functions: in the lustres of Venini of Murano, for example, this definition at once evokes the well-known hanging lamp, with branching arms arranged round a central bowl, in the manner, though simplified, of the lustres of the Louis XIV or First Empire periods. The delightful material, tinted azure, beryl, sepia and amethyst, used by the Venini factory, adds novel attraction to their fittings. Certain French artists have designed original lamps rather in the same style, among whom might be mentioned Maurice Dufrène, one of the originators of the modern revival, who aims at an effect of unity; Paul Follot, his companion in effort, whose taste lies in rich exquisite work, combining a high ideal of perfection with close attention to all the details which make for quality; René Lalique, whose fertile and masterly power of invention is displayed in lamps with magnificent illuminated scrolls, sheathed with foliage forms, and the torches decorated in the Greek or Chinese manner, which are of ethereal loveliness; Josef Gerner, of Bor-Haida, who executes lamps of sinuous contours in luminous Bohemian crystal; and J. J. Walsh, who produce delicately intimate effects with coloured crystal.

In contrast to the styles of richness and elegance, however, is that of sober simplicity. The silhouette becomes more severe. Hanging lamps replace the lustres. Some consist of hollow globes, constructed of polygonal plaques, simply attached by wires. As decoration for these René Lalique displays a thousand imaginative ideas. Clustering foliage or sprays laden with hoar-frost, executed in varying depths of engraving, are interlaced over the glass. This solicitude for clothing the whole of the surface is due to the artist's desire to give decorative value to the sphere, isolated in space, and an effect of brilliance analogous to that of the cut-crystal lustres. And by diffusing the rays of light refracted by the undulations of the surface, he tempers the unbearable glare of the naked electric bulb. In fact, all decorators who used the hollow sphere are careful to correct the glare. Genet and Michon used to employ unpolished glass for globe shapes, with an embossed surface. One of their recently designed fittings is made like a terrestrial globe, with the idea of resembling the old-time mariners' maps. The continents are in relief, scored with lines of latitude and longitude, while frigates sail the seas and whales throw up "waves." Or, again, the globe is transformed into two hexagonal pyramids, meeting at the base, their triangular planes enlivened by geometrical motifs. Sabino is responsible for some fine models of spherical hanging lamps, the globe being composed of five-sided convex plaques with concentric relief decorations, sometimes joined together with lead. DIM have another method of abating the glare of the light, encircling their opaline sphere with a nickelled spiral. With like intention, the Orrefors crystal works, in Sweden, inscribe their milk-white globes with even, undulating rings which are called waves.

Gispen's Fabriek, the Dutch firm, do not share the urge to make concessions to human weakness; with rationalist severity they sacrifice every form which could be infected by decorative intention. Totally excluding ornament, they confine themselves to tapering cupolas or hemispheres in white glass which diffuse the light, suspended from a metal belt. The fittings of the engineer M. Prokop, of Prague, are inspired by the same conception and are well planned. The scientific style in decoration is less apparent in the work of J. E. Koula, his compatriot, who aims at producing picturesque designs, as, for example, four identical white globes set on one metal axis. The same preoccupation is evident in the designs of Wolfgang Tumpel, of Halle, and Max Taut, who, for the lighting of the assembly room of the German Typographical Union, suspends from the ceiling two lamps fitted with long panels of unpolished glass and three transversal arms, each at right angles, in the same manner as the ship models which are so fashionable these days. Richard Schulz, of Berlin, even though he uses extraneous ornament, at least spares the spectator the unpleasing sight of vulgar over-decoration, of which the more unequivocal of his colleagues are so prodigal. His hanging lamps are, it is true, purely technical, but commend themselves by their feeling for proportion and an understanding of composition which is rare.

The other type of hanging lamp consists of a suspended bowl. At present, however, it is impossible to make single pieces of sufficiently large dimensions, so that the surface has to be divided into a number of parts which are enclosed by a bronze framework. There are many varieties of this general idea, produced notably by Genet and Michon in France, and René Lalique, and by J. J. Walsh in England, taking into account original designers alone. The French, moulding in relief, the English, with hollowed-out designs, are both aiming at the same idea of diffusing light by means of uneven surfaces. Then there is the "concha" or shell shape, elaborately extended. Lalique arranges spurs, radiating out from the transparent bowl. Genet and Michon, faithful to unpolished glass, transform them into brackets, groups of which are crowned with cylindrical shades.

Another solution of the problem was first devised in 1922, when the hanging lamp, made of sheets of glass enclosing the light in their vertical planes, was produced in many different forms. Some take the shape of a kind of valance, arranged in two or three tiers. Others are like a sheath, with scalloped edges, and are made uneven, so as to look crooked. As in the time of the *Incroyables* at the end of the eighteenth century, the height of civilisation is to appear clumsy and naïve. This affectation only impresses those who are initiated; it offends the common-sense of the profane. Some of the lamps are enclosed, the glass planes being set in lead instead of being hooked on. Finally, there are the long tubular electric bulbs. Jacques and Tony Socard, specialists in the restoration of stained glass, have constructed some interesting fittings in this manner. They

use machine-made corrugated glass. Mallard, Vallenduc and Dubois have successfully exploited the same general idea. A similar style is found also in Poland, in the unusual design of Professor Bartlomiejczyk, executed by A. Marciniak, of Warsaw. His fittings are composed of several tubular bulbs, one above the other, divided by crystal wings with crinkled borders; which both increase illumination by multiplying reflections and soften it by diffusion. This is a rationalist solution. The clever German architect Wilhelm Riphann solves the problem for his part in a decorative way: his fitting is formed of two metal spirals, turning in opposite directions, separated by a crystal disc, from each of them being suspended pendant drops in poignard form, which act as prismatic reflectors.

The idea behind this arrangement can only be decorative, since it is clear that it is not based on utility or technical necessity. The design is an end in itself. It is the same with the original or merely quaint inventions, attractive while they are in fashion, which are produced in such large numbers. It should be recognised that they are in a general sense an application, expressed with some skill, of modern "scientism," that is, the awed and timid mysticism aroused by the marvels of the laboratory and the harnessing of the power of the machine. In 1925 the brothers Adnet began to design the fittings, which are purely imaginative, but resemble scientific instruments, cogwheels, condensing tubes or distilling apparatus. In Desny, they have a competitor who is not, however, an imitator. He has designed lamps which are like motor cylinders, bristling with ledges which remind one of the slats of a ventilator, or else with discs suspended from nickel hooks, as in certain acoustic apparatus, or upright mechanical bellows, or great spherical lenses, directing a monster eye, like that of an H. G. Wells Martian, on the workers' bench. All these picturesque ideas are of recent invention. The modernists of the International Exhibition of 1925, such as René Herbst, Pierre Chareau and Mallet-Stevens, designed nothing resembling them. Their hanging lamps were very simple, with the idea of blending discreetly with the general decoration, but they did not derive from the light itself the same happy effects as are obtained to-day. The technical methods of the syncopated style reappear in the fittings of Guevrékian, which consist of an illuminated cylinder, intersected by a vertical slat, not unlike a stop shutter. Genet and Michon design hanging lamps in the shape of big vertical illuminated tubes, divided at regular intervals by crystal discs, which serve to reflect the light. Maurice Dufrène is the designer of some graceful lamps made of three crystal plates held in position by circular rods of nickel: an ingenious and discreet allusion to electrical apparatus.

Most of the designers in Germany, Italy, Holland and Central Europe are developing similar ideas. On the one hand, they are evolving the type of fitting in which the electric bulb is set among plates of glass, like a pistil among petals—a successful idea, the invention of which can be traced back to Pierre Chareau. There is an ingenious variation

of it, consisting in using triangular instead of square plaques. Felix Grange arranges them so that, with the bulb enclosed within the plaque, they suggest the sweeping movement of an aeroplane. In Germany, where the art of the electric sign is highly developed—a branch which is outside the scope of the present work—glass gives way to metal. It is the apparatus itself which is most important, and has decorative value: the electric bulb, round or tubular, is merely an accessory. Wolfgang Tumpel is an engineer of illuminated signs rather than a glass-maker, and so with Gunther-Hirschell, and Protsch, with their cruciform lamps with illuminated arms, and Paul Tucker and Franz Singer, of Vienna, whose fittings systematically reveal their construction, and are intended to show their clever mechanism. There is also the Dutch decorator Van Ravesteyn.

Gabo, the German decorator, employs glass for the manufacture of his strange decorations, whose fantastic geometry flouts every principle, but yet succeeds in being amusing to look at. P. Chiesa, of Milan, gives well-judged prominence to the opaline glass used in his clever fittings which are inspired by the beauties of science.

A significant fact is that the simplification of forms and rejection of ornament which characterise the present-day designs for movable lights are equally apparent in fixed lighting. Genet and Michon, in 1921, were the first to think of lighting rooms with rows of bulbs surrounding cornices, arches and lintels, reducing the glare by shading them with half-cylinders in pressed glass, decorated with ornamental motifs in high relief. The two engineer-glass-makers evolved a regular technique for this, the principle of which was adopted by many of their colleagues. The box lights of Lalique were conceived in quite another spirit. Here the lighting takes its share in the general decorative effect. It plays its part in a symphony in which the golden-brown tones of light woods, sycamore or plane tree, blend harmoniously with softly diffused illumination. There is a parallel in architecture itself for the use of glass in this way, as exemplified in the bathroom designed by Albert Laprade in 1925, which is a veritable cage, its square glass panels (engraved by Daum) illuminated by exterior lamps. On similar principles are designed the great wall panels of glass plaques decorated with conventionalised figures and fruit executed by J. J. Walsh; and also the door above the hall dais in the hotel at Dax, by Genet and Michon, constructed of engraved glass tiles, incrusted with mouldings of pressed glass. These are doubtless indications of the possible trend of future developments. The visible bulb is trying, and all efforts are directed to the abatement of its glare. It may be shaded by a screen—Ruhlmann's fan, for instance, or the conventionalised cornsheaf of André Groult, or else illuminated soffits of pressed glass. Certain thoroughgoing rationalists believe in the use of the machine-fitting in its unequivocal nudity. Once this phase of absolutism has passed, however, attention will be turned to methods of lighting which are both pleasant and soothing, and, if the word may be allowed, sedative. And then the reign of glass in lighting will be re-established.

# VI. STAINED GLASS

THE art of stained glass deserves a volume to itself, and few crafts possess such rich sources of information. Its history, however, considered from the poetical and æsthetic point of view, would be out of place here. In a survey of the uses of *glass*, it is from the special viewpoint of technical formulæ that we must examine the evolution of stained glass in civil and religious architecture. Our inquiry will be directed to types of production completely unknown to the old masters, secular decorative glass being of comparatively recent origin, and the beautiful tradition, interrupted since the sixteenth century, having only just been revived in ecclesiastical glass.

The principal obstacle in the path of the rational development of stained glass—translucent mural tapestry—was the love of virtuosity, and the taste for anything which was difficult, the insatiable desire for display, and it finally lost all its original features in the attempt to resemble painting. The moderns have made lengthy and deserving efforts to restore the true principles and secrets of ancient stained-glass work. The glass-makers have realised that the impeccable regularity of their products is a drawback and not an advantage in stained glass. "It is rather in its excess of perfection that glass errs," wrote M. de Lasteyrie at the period when the Service for the Preservation of Historic Monuments was being organised in France. Of this singular pronouncement Viollet-le-Duc supplied the explanation: "The inequality in the thickness of glass, which makes the setting in lead so difficult, is one of the causes of harmony and brightness of tone. When the glass is flat and of equal thickness, the light strikes each of the panes of a stained window at the same angle, and this results in uniform refraction; but when, on the contrary, these panes are uneven and of unequal thicknesses, they present to the light, externally, surfaces which are not all on the same vertical plane; from which there results a varying refraction, adding singularly to the relative brightness of the tones."

The Jury of the 1900 Exhibition drew attention, although with circumspection, to the first signs of a return to those methods which the United States, in the persons of Healy and Millet, had begun to initiate in 1889, an example soon followed in Germany; in Austria, by A. Luthi, Liebert, Hans Unger, Hans Pfaff and Christiansen; in Poland, by Josef Mehoffer; and in France. To-day, from the technical point of view, the art of stained glass aims at all the effects of the ancient method of leads outlining forms, and glass tinted through and through. The brush is only used, as in the Middle Ages, to complete the design, without ever attempting imitation. Even the least scrupulous of modern glass-workers exclude this facile "short cut" from their work.

There is not very much to say about the new tendencies in the United States. Several years ago two principles could be distinguished : one was the stylisation of forms through simplifying their expression, and the other was the production of a rich effect by the employment of greatly varying methods : superimposition of glass, the introduction of thick rippled glass, " cathedral " and unpolished glass, and painting faces and nude parts with enamel. The American artists bring to the accomplishment of their ideas an enthusiasm which is equal to the careful execution characteristic of their work. But they remain faithful to the " Gothic " ideal. The affectations of craftsmanship in which they delight were also known to the medieval artists.

Under the inspiration of Walter Crane and William Morris, masters such as Christopher Whall have developed the British art of stained glass, during the whole of the nineteenth century, in a special manner. This great artist united a very judicious and also very personal understanding of the important effects gained by the arrangement of " leads " with a profound feeling for dignity and beautiful attitudes. Christopher Whall would always accentuate by painting the shapes cut out of the glass. On the other hand, Leonard Walker rarely uses this subsidiary device, and that only for parts which it is difficult to treat otherwise—faces and inscriptions. The London artist has a remarkable gift for dramatic design. His " lead " outlines, which skilfully enhance the colours they frame, participate with amazing certainty in the general movement of the composition. Leonard Walker also loves rich-coloured materials, and obtains powerful, bright effects with marbled glasses, without dulling their transparency with opaque painting. The scrupulous conscience of the British craftsmen would not, during the pre-Raphaelite period, permit of any part of the window being left bare, as is proved by the work of Heaton, Butler and Bayne, and of George Wragge, which has already become past history, but whose influence is not yet entirely passed. Leonard Walker substitutes for this style his more energetic and transparent technique, and his infinitely more intense dramatic expression, confining himself exclusively to the legitimate resources of the craft. Reginald Bell is divided between the medieval technique and that of the Renaissance, which, with the use of veined and marbled glasses, admits of enamel painting with very subtle modulations. A different method is employed by Lawrence S. Lee for establishing a style appropriate to stained glass—the art of decoration on a grand scale. This artist makes use of a naïve archaism, not without charm, and which in its very conventionalism lends itself successfully to the necessary simplifications. The same idea, but carried out more arbitrarily and with greater insistence, is displayed in the work of M. Forsyth, who displays a certain humour in the decorated glass destined for elegant interiors.

The Belgian artists, whose style resembles the British, are as definitely divided as the painters of their race with regard to the æsthetic and even the very spirit of art.

Traditionally obedient to academic laws, F. P. Colpaërt composes transparent pictures, of which the whole surface is covered with highly modelled and very formal design. J. Wyss, on the other hand, and the Fauquez glassworks utilise the strength of line of the "leads" with greater hardihood and success, and compose generalised forms in vigorous synthesis which others express by multiple detail. J. Wyss, too, introduces artificial specks into the glass to the extent of lessening the transparency. The Swiss glass displays the same tendency to reinforce the effects proper to glass by those of painting. Although the master, Edmond Bille, might be reproached for a certain affectation of archaism, from which his compositions, in particular his admirable *Bataille de Sempach*, derive no special advantage, the freedom of the divisions and the vigour with which they are affirmed are a corrective to the sombre colouring produced by the use of the brush. Even more emphatic in this direction, the technique of Alexandre Cingria includes much heightening with enamel, applied to the coloured glass in the same way as touches of *goucahe* on water-colours. Cingria, too, goes beyond the objective representation of the motif and arrives at a kind of expressionism, which is not unimpressive. Norway possesses in Emanuel Vigeland the author of admirable stained glass, executed in accordance with the authentic methods of the Middle Ages. His ardent and fertile imagination is allied to a passionate love of colour. Working in the ancient manner, on sheets of glass stained through and through, whose inequalities of thickness and consequently of tone he skilfully turns to account, Vigeland selects the characteristic accents of the forms, obtaining by their juxtaposition an effect which is essentially different from both painting and mosaic, an essentially luminous art, in which light, even more than colour, is the most important factor.

Joep Nicolas, Jaap Gidding and Roland Holst represent Holland in the art of stained glass. The first specialises mostly in windows for secular buildings, intended to be seen at close quarters, so that certain subtleties in execution and experiments in mother-of-pearl effects can thereby be better appreciated. Joep Nicolas is really a clever painter rather than a glass-maker by profession. His "leads" outline a head or divide a form in such a pronounced way that his art would seem to be a manifestation of that form of modernism which affects "primitivism" and the syncopation of pictorial caligraphy. Jaap Gidding, for his part, is content with geometrical compositions, occasionally enlivened by a recognisable figure. Roland Holst, on the contrary, arranges his "leading" with minute care. While aiming at the rhythmic line which is so dexterously used in modern art, his design is firm and broad in the treatment of mass, which, in its turn, is heavily outlined by the leads.

Spanish glass is, generally speaking, distinguished by the clearness of its arrangement and the legibility of its composition. Though their styles are different, Luis Rigalt, of Barcelona, and Maumejean, of Madrid, have this trait in common. Messrs. Maume-

jean's work is Renaissance-Classical in style and technique, and owes its remarkable clearness of design to the " leading," which interprets form in the manner of the painter's brush. The technique here is so distinctly superior, that it is to be regretted that the Madrid masters on other occasions sometimes use less strictly pure methods, such as painting and enamel. Luis Rigalt has likewise applied this " caligraphy " method to his leading, as is exemplified by his *Notre-Dame de Lourdes* in the episcopal palace at Barcelona. His original work comprises a large proportion of windows for private houses, usually painted in enamel, whose style is not without brilliance.

G. Zelenski, of Cracow, is mainly an interpretative artist, and from this arises his apparently disconcerting variety in style, which ranges from essentially Polish methods, exemplified in the church windows of Tarnopol, executed after Kazimier Sichulski, to the most classical manner in the Italian sense of the word, exemplified by the *Apostles* in the Temple of Warsaw, executed after Maszkowski, and to the most modern in the pedantic sense. The *Archangels*, designed by Professor Chotodny for the cathedral of Lwow—interesting compositions, emphasised by the manner of leading—are based on the last-named style, which is expressed with even greater completeness in the window representing *Work* made by Jan Piasecki for Königshütte, and the medallions of the *Prayers*, designed for the temple of Tory by the same artist. The last two works, although they have interest from the point of view of subject, are executed by doubtful methods, in that they are painted glass. The *picture* conception in this case dominates the *glass-making* conception, contrary to the example of Josef Mehoffer, so eloquently inspired by the noble windows of the Cathedral of Cracow.

There is the same tendency in Austria. At the Kunstgewerbeschule of Vienna, whether the massive and crowded compositions of Professor Reinhold Klaus are in question, or those of Dora Jordan—evidently his pupil—or the arbitrarily shaped forms of Elisabeth Karlinsky, there is a disposition towards pictorial effect, foreign to technical purity. J. Ulrich is alone in aiming at plastic expression by means of the " leads."

In Italy, stained glass has thrown off all medieval influence. P. Chiesa, of Milan, forms a great network of leading and inserts it with pieces of painted glass, which are actually pictures, lit up from behind, and not stained glass. Messrs. Cappellin, on the other hand, conform to the spirit of the craft. They are responsible for some decorative windows executed entirely in coloured glass, in which are dexterously inserted enamelled pieces sparkling like jewels.

In France, where there are a remarkable number of painter-glass-makers, all these phases, and others beside, have been experienced. The traditional technique is practised, as in the work of Hébert-Stevens, Maumejean and Henry-Marcel Magne ; the setting of coloured glass without additional painting, as in that of Jacques Gruber, Auguste Matisse, Chigot, Damon, Balmet, Crevel, Gaudin, Raphaël Lardeur, Albert Gsell and

Jacques Simon ; the use of industrial opaque glass, as in that of Louis Barillet, Ray and Chanson, Marguerite Huré, Chigot, Joel and Jan Martel and Theo van Doesburg ; cabochons (Jacques Gruber) ; enamelled glass (Léon-Paul Fargue and Louis Schneider) ; sand-blasted glass (Gaétan Jeannin) ; and cement *claustra* fitted to pieces of coloured glass as used by Auguste Perret. The style based on the method of the Middle Ages, which is employed each in his own way by the first three named, is displayed in its most dramatic form in the Douaumont Oratory. For the seventeen windows of the chapel, George Desvallières, the most emotional of painters, has designed stained-glass cartoons which have been executed with great exactitude and conscientiousness by Hébert-Stevens. It is an epic of the warrior. Stern angels receive the soul of the hero, and the sorrowing crucified Christ leans down His face towards him in pity. Elsewhere, the military chaplain is celebrating Mass in the trenches, and grave stretcher-bearers carry a dying soldier on a bier. Hébert-Stevens employs thick glass of which the surface has been made slightly uneven by intense baking. Glass which is not quite flat is more readily irradiated by the light. And by increasing the partitions, the glass-maker passes more easily from one tone to another, though the effect tends to be dazzling. Hébert-Stevens does not neglect any of the legitimate methods of the craft. At times, he strengthens his effects with *grisaille*, and at others he emphasises the indelible silver yellows. Again, he uses flushed or " cased " glass, with the nether layer excavated in places by clear acid or sand-blasting, or enriches white glass with translucent enamels.

Jacques Gruber has a stricter system. Although he does not forswear the use of the brush as an auxiliary device, *grisaille* is, he believes, " an element of contrast, intended to set off a material which is *par excellence* rich in itself, and providing an element of contrast by virtue of its very poverty." And he considers it necessary to guard against using *grisaille* as a semi-fraudulent means of counterfeiting—through the modelling proper to painting—a style which is limited by the one pure and valid method of " leading." In the works of the French master this theory of stained glass is rigorously applied. It is clearly a refinement on that of the great Middle Age period, but retains the spirit. With an extremely personal feeling for colour, Jacques Gruber possesses an exceptional decorative sense. Few artists are gifted with such expressive clarity and emotional power of line as characterise his compositions. The ancient theorists were perfectly aware of the value which lies in the direction of the principal lines ; as when the Renaissance sponsored " pyramidical " composition, and the French classical school analysed the various psychological states induced by the arrangement of lines, both being fully aware of the secret " contrivances " of the art. The moderns have outbid this teaching. Decorators have considered that the design should not be too strongly emphasised. In this connection Edward Gordon Craig has a complete and very ingenious theory. Jacques Gruber shares his conclusions. He emphasises the dominant design of

the composition, and subordinates the secondary lines in such a way that the principal line receives fresh emphasis, as is exemplified in the great fishing net drawn obliquely across his window *The Draught of Fishes*, or in the composition where the face of the Virgin is turned to the light, executed for the church of Preny, in Lorraine. Of the compositions conceived in this spirit most are strained, deliberate and forced. They are sombre in aspect. Those of Jacques Gruber are gay and radiant. The artist produces intense effects of ardour, joy and enthusiasm. He loves colours that are gay and bright; he has no timidity. With a boldness justified by its results, he hit upon the idea of enriching his windows with great cabochons, which, set in the "leads" like any other piece of glass, as in his magnificent window *Exotism* at the Salon d'Automne in 1926, confer a character of rare distinction and quality on the whole design.

Auguste Matisse is primarily a painter, who has become a glass-maker owing to his love of brilliant colours. He is therefore unhampered by the traditional customs and usages which the craftsman voluntarily accepts as unalterable laws. Auguste Matisse's theory is that in the decoration of a room the stained window should not be considered as of the same importance as the furniture. It should give the impression of a view through a window, but should avoid suggesting a view seen through glass. This entails using transparent glass, clear and brilliant in colour, free from medieval severity, and executed in large rounded pieces. Auguste Matisse, in fact, is opposed to angular shapes as being contrary to the craft. He is also opposed to *grisaille* and only uses glass stained through and through, which he cuts so as to derive every advantage from the varying thicknesses. Francis Chigot likewise upholds the medieval technique, at least in so far as it is concerned with the use of stained glass without *grisaille*. Francis Chigot, however, is less exclusive than Matisse in his choice of materials. He was among the first to be successful in the use of ordinary industrial glass, and displayed great judgment in experimenting with the pearly radiance of transparent reliefs and the designs in which they were executed. Louis Balmet, who made a beautiful series of scenes from the *Life of St. Christopher* for the church of Châteauroux, and Raphaël Lardeur, designer of the windows for the church at Thonon, and Marcel Magne, who executed the Bougival and Sacré Cœur windows, are representatives of the medieval school. With their naturally modern style, which is, however, free from æsthetic fads, they combine the pure methods of the past. René Crevel is attracted by conventionalised simplifications. Jacques Simon aims at broad effects in design. Jean Gaudin has obtained some original picture effects with leading accentuated by the thickness of opaque lines. Damon also derives a means of expression from leading.

The Exhibition of Decorative Arts in 1925 revealed in a striking manner the artistic possibilities of ordinary industrial glass for use in decorating windows. Ribbed, rippled, speckled, striped, threaded with "canes," sand-blasted, tubulous, laminated and

reticulated glasses of the cheapest grades, catch the light with a sparkling effect of which the professional eye of the glass-makers quickly appreciated the delicacy. In the windows of Louis Barillet, varieties of these glasses are cleverly cut and arranged, and still more skilfully combined, producing with their play of light and shadow an effect akin to colour. Since this achievement, which was decisive, this French master-glass-maker has continued working on similar lines. While he still produces compositions according to the traditional technique, but in a very personal style, such as the moving designs of the church windows of Montligeon, he also executes large glazed windows, such as that of the " Semaine à Paris " offices (a characteristic work), with this new type of manufactured material, to which he adds opaque enamels. Louis Barillet avoids dimming the transparency desirable in stained glass. His work is extremely luminous, although it seems to present an impenetrable veil to the eye. The same may be said of the work of Ray and Chanson, subtle interpreters of modern taste; of Marguerite Huré, who executed the church windows designed by Maurice Denis; and of purely decorative artists such as the brothers Martel and the architect Guevrékian, who designed an original garden decoration, consisting of enormous bulbs or blibs with decorated facets of glass, set in " leads " like stained glass. Theo van Doesburg eliminates all figurative motifs from his compositions and confines himself to purely geometrical design, and so approximates to the German technique, which will be dealt with presently.

First, however, we must complete the list of French methods. One of the most successful, producing effects of great beauty and richness, is the glass executed by Louis Schneider with translucent enamel, as is also that of Léon-Paul Fargue. These modern glass-makers have made regular use of an element of beauty which the Renaissance masters only dared employ on exceptional occasions. It is true that the relative opacity of coats of enamel diminishes the transparency of the glass, but this drawback is remedied very skilfully by these two artists, by means of surrounding each panel with a transparent background, which also has the effect of adding to its value. At last, some ten years ago, glass decoration for windows by the sand-blast methods was suddenly evolved by Gaétan Jeannin. The process was discovered in 1870 by the American engineer Benjamin Tilighman, of Philadelphia. It consisted, as is known, of projecting fine sand by means of a strong current of compressed air against a glazed surface, which very rapidly lost its polish, was hollowed out or pierced with perfect sharpness. This method was so violent that it remained impracticable until 1922, when Gaétan Jeannin discovered a method of protecting certain parts of the design by coating the naked glass with a special paste, impervious to the sand-blast, and soft enough to be trickled from a tube so as to cover the parts to be protected. The glass is then exposed to the jet of sand which is directed by an operator encased in a sort of diving headgear. It is a delicate operation, necessitating both experience and intelligence, since the artist not only obtains the con-

trast of matt with polished parts, but a number of new effects arising from the impact of the sand. Gaétan Jeannin made a complete register of the effects which are changed by the accidents of light. This clever engineer and decorator does not, on the other hand, object to the accessory method of engraving with acid, the application of gilding and silver, and enamelling. From the combination of these various processes was evolved one of the most attractive styles for window glass and other decorative purposes, and one of the most novel created by modern art. Gaétan Jeannin has also applied his idea to monumental works such as the altar cross of the church at Boussois, a town of glass-makers.

The design of the distinguished architect Auguste Perret for the windows of the church at Raincy was conceived in quite another spirit. His idea was to construct a well-lit church of which the windows should present, not a series of representations of figures, but a kind of symphonic orchestration, the general effect inducing a subtle but powerful emotion. He therefore arranged the glass units, which were shaded and extensively subdivided in colour registers ascending, through intermediate nuances, from yellow and red to blue—as it were from mere matter to spirit—the terrestrial tones occupying the lower parts of the windows and the nave, and blues the higher parts and the choir. The body of the church thus appeared as an immense luminous reliquary, in which profane thoughts were purified before attaining spiritual peace. The large area of glazed surface exposed the windows to the danger of wind pressure, but Auguste Perret made provision for this. He substituted for " leading " thin sashes of concrete, moulded and left rough as they came from the moulds, which could be assembled to form the composition required. The design only includes five primary figures : the square, the rectangle, the circle, the cross and the barred lozenge. These shapes, however, can be combined in different ways, as many as five times five. It is strange to see in the rational employment of modern materials, such as reinforced concrete, a return to the *claustra*, the curved tiles which supported the *cives* of ancient Oriental glass.

The tendencies in Germany seem to lie in quite other directions. The revival which was initiated with such force in 1900 has not developed as far as might have been expected. Stained glass in houses seems to constitute, in the eyes of a nation given over to scientific positivism, not only useless luxury, but an encumbrance. One great factory carries on the work of Lechter, Liebert, Endner and Spinn, the most important exponents of the designs of the German painters of 1900—the factory of Puhl and Wagner, in Berlin. Their productions are peculiarly characteristic. They transform into painted glass the expressionist cartoons of Peter and Cesar Klein, and they likewise execute the decorative compositions of Schröter, in the style of the eighteenth-century pagodas. Leading is sparingly employed in these illuminated pictures, which hardly comply with the description of stained glass. Puhl and Wagner show preference for purely geome-

trical compositions, mingling pieces of glass coloured through and through with those painted with *grisaille*, the large parallel stripes of which the decoration consists combining successfully with the lines formed by the framework. There is an evident intention to suggest an impression of peace, which is produced by the repetition of shapes without figurative significance, and consequently incapable of inciting the intellectual effort of identification. It is decorative art, with psychological preoccupations.

# VII. GLASS IN ARCHITECTURE AND FURNISHING

It is in manufactured window glazing—heavy or "mass" glazing, if the essentially modern meaning of the word may be stretched so far—that Germany takes the lead. The new German architecture may be briefly defined as an even alternation of filets and plate glass. The façades are of glass from top to bottom, and from end to end, and even the ceilings are glazed. But the perfection of the glass so extensively used in architecture is not peculiar to Germany. It is so universal that it needs no comment here. On the other hand, the importance of glazing in the façade constitutes, rather, a specific department of modern architecture, and its preoccupation with hygiene and the admission of sun and violet rays, than of glass itself. To-day in the big shops, office buildings, counting-houses, engineers' offices, workshops, factories, schoolrooms and assembly halls, hospitals and studios, the maximum of sun is encouraged. A topical instance is the design for the Magdeburg Sanatorium by Walter Schwagenscheidt. On this hygienic basis, however, the Germans have evolved a definite style. The long lines of the horizontal strips and windows, the contrasts being judiciously planned, are powerful and striking in effect. The arrangement of windows in classical architecture consists of a series of dark spaces destined to give value to the light spaces in which they are set, while the horizontal German windows, with no projecting stone or cement to frame them, themselves contribute, on the contrary, a positive value to the general effect. Their windows do not appear as a vacuum but solid. This new conception, which is utterly opposed to traditional usage, is displayed in certain works by the leading spirit in modern German architecture: Walter Gropius—for example, his boot factory at Alfeld and the Palace of Architecture at Dessau in particular. But this is not an isolated experiment. It is a general theory which was applied by Peter Behrens as early as 1907 in his stately turbine factory at Berlin, and has been adopted by most of the German architects.

Simultaneously with plate glass the German architects use glass bricks and tiles. In their efforts to confer solidity on the light-producing material, the building experts have developed the construction of walls and ceilings formed of thick glass bricks and discs, encased in a framework of metal, thus diffusing a pleasant and brilliant light. Karl Crayl has used them with happy effect in the Public Assistance Offices at Magdeburg, with its great glazed roof and transparent staircase well. No less characteristic are the glass walls of the Public Assistance buildings at Halle by Martin Knauthe: those of the Savings Bank at Düsseldorf, and the staircase of the villa Kluge at Berlin, by Anker and the

brothers Luckhardt; and the aviation hangars of Siefert. The steel framework may seem to some too fragile, and G. Metzendorf substitutes a framework of concrete in which the glass squares are encased, as in the Municipal Library at Essen. The material used in all these buildings is the production of the Luxfer Company of Berlin. It is made in the most varied forms: balls set inside a square; ribbed or grained panes; long rippled panels, like those in the entrance hall of the Lichtburg in Berlin, designed by Fraenkel; panes cut into diamond shapes like those in Zürich station, by Looser; slabs moulded into four parallel grooves, which are laid alternately in a horizontal as well as a vertical position, as, for example, the transparent walls of Magdeburg Town Hall, designed by J. Goderitz, the municipal architect; and those of the Potsdam almshouses, by the architect Mohr; those in the petrol stations of Hamburg; and those of the illuminated towers in Berlin, by Bruno Taut.

The modern glazing system has passed beyond the frontiers of Germany. Luxfer bricks have been used by the architect of the Budapest swimming baths, where the alternation of large *lentilles* with vertical ribbed squares is particularly pleasing. It appears again at Lemberg, where it has been used by the architect Kasler for the vaulting of a public passage; at The Hague, where Walter Buys has employed it for the base of the lofty staircase tower of the Volharding premises.

Sometimes glass is merely an element for filling a vacant space, bearing little weight and forming, as it were, immense transparent cages such as those designed by Melnikoff for the Soviet Republic exhibits at the Exhibition of Decorative Arts in Paris in 1925, and the Telegraph and Radio headquarters of the U.S.S.R. by Weegman, or the *Pravda* offices at Leningrad by Wesnin, sometimes it forms part of the constructive material. In 1903 the brothers Perret employed it in this sense for their house in the Rue Franklin, where the staircase wall—which was too near to the next house for a window to be inserted—was constructed of Falconnier transparent bricks. This was the first occasion on which glass was used in such a manner, and its invention should be credited to the two French glass-masters who were also the original inventors of reinforced concrete. To-day the House of Glass, for which Jules Henrivaux detailed the plan in a curiously prophetic article in the *Revue des Deux Mondes* of November 1st, 1898, has emerged from the realm of hypothesis. Possibly the skyscrapers of Mies van der Rohe are little more than experimental applications of a theory, but the house of Jean Dalsace, which Dindeleux is completing in Paris according to the plans of Pierre Chareau, has a more practical significance. It is constructed of "Nevada bricks," blocks of cast glass, which have been produced since 1928 by the Saint Gobain factory, the same firm who before 1900 had made the glass tiles and slabs of which Bouwens van den Boyen constructed the paving of the Crédit Lyonnais buildings in Paris. The new Nevada brick measures 20 cm. on each side, and is 4 cm. thick. The face of the brick is grained, and the back

hollowed like a cup, which lightens it and assists the diffusion of light. The lateral faces have deep grooves into which are fitted the cement transoms. The Dindeleux glass paving is slightly different. It is cubic, with two parallel grooves hollowed in the four lateral faces. Albert Gerrer, of Mulhouse, has still another method of making glass bricks, which are blown, not cast. Mdlle. Marguerite Huré, of Boulogne, has just invented a fourth method, a sample of which may be seen in the Missions Pavilion at the Colonial Exhibition in Paris. It consists of an ordinary hollow brick, forming a cylinder with rectangular outer sides, the extremities closed by two plaques of roughened glass, their edges grooved for the purpose. There have been similar experiments in Belgium. Glass slabs, fixed with concrete, were used by Blanpain-Massonnet for the construction of the roofing of Antwerp Airport and the Rotunda of Brussels Stadium. The Fauquez glassworks manufacture another product, the *Helios* brick, made for insertion in a metal framework. In Czechoslovakia these problems have also been studied. The Exhibition of Glass at Zelezny-Brod, in 1930, displayed glazing materials in every aspect. For bathrooms, laboratories, clinics and workshops there have also been produced in the ancient glass district in Bohemia a noteworthy speciality in the slabs of opaque, "*sang de bœuf*" glass, with which J. Riedel constructed the brilliant facing of the National Czechoslovakian Pavilion at the Decorative Arts Exhibition of 1925. This material is known by special names in different places. In Czechoslovakia it is called *kalopaxit* by the A.G. Glassworks of Prague. In Belgium it is called *marbrite* by the Brabançon factory of Fauquez. It is, of course, a species of cast glass, coloured, more or less opaque, and made so by the addition of fluorides of calcium or of sodium.

Last in the list of types of plate glass used in construction is *Triplex*, employed for tramcar windows, and the wind-screens of cars and aeroplanes, which has lately undergone even greater improvement. It formerly consisted of two sheets of glass with a transparent layer of cellulose material between. The factory of Saint Gobain and of Boussois, who produce it under the direction of M. Georges Despret, have evolved a new method of manufacture, which confers on it the curious property of "Rupert's drops": the new *Securit* glass. It offers enormous resistance to strain as well as to shock, and when an exceptionally violent impact causes breakage, it instantly bursts into a cloud of powdered glass, reducing thus the risk of inflicting injury.

For some years past, glass has been used for decorative purposes in a manner which relates alike to the technique of stained glass and to mosaic and architectural glass, that is, "transparent mosaic." It is obtained by piecing together small segments of glass embedded in a thin layer of cement, following a sketch, according to the form they affect. The transparency of the glass which composes these designs produces remarkable luminosity, richness and brilliance, and is greatly superior to the mosaics of coloured

marble or earthenware, such as are ordinarily employed. In 1900, a few mosaic workers began to make use of pastes of glass. These were Tiffany, in America, and Puhl & Wagner in Germany. The latter still use this method. The pediment of the *Trades* in the Munich Museum is eloquent testimony of its successful use. In France, Guilbert Martin, Lemeire (in the church of the Madeleine in Paris), Labouret, Jean Gaudin, Louis Barillet and the brothers Maumejean, combined with the matt tones of coloured cement the gleam of opaline and paste of glass, and in due course Gentil & Bourdet enriched the repertoire of decorative devices by reviving the ancient processes of " Christian glass." Their Venetian enamels consisted of gold leaf affixed to a glass cube by a thin coating of clear fused enamel. The two collaborators made extensive applications of their method. One of the most important was the facing of the Galleries of the Nations at the 1925 Exhibition. Mosaic is essentially an interpretative art, a synthetic abbreviation, in a word, of the eliminating process in which decorative style consists, and which the artists of the high Middle Ages had so accurately codified. In Switzerland, where national characteristics maintain great independence, something of the ancient caligraphy has been revived. The Geneva Museum possesses a glass mosaic, by Percival Pernet, which displays complete understanding of the principles of this class of work, combined with modern taste.

We have observed that plate glass has an increasing importance as a building material, and this is equally the case in the domain of interior decoration. In an epoch which is supposed to be luxurious and dandified, the pleasant mission of the looking glass could not be dispensed with, and it is assuming fresh aspects of beauty. The old type of silvered backing which tended to tarnish, has been replaced by another, which increases the brightness of the crystal with its own white brilliance. Certain decorators enliven its plainness by slight decorations finely engraved with acid. Others use enamels, following the example of the Second Empire, since, as La Bertin, " minister of modes " to Marie-Antoinette, confessed, the most recent novelties are nearly always old ideas and articles rescued from oblivion. Plate glass also does duty as a screen, when it is rendered opaque by enamel decoration or sand-blast engraving, as is exemplified in the glass doors with imitation curtains, by Gaétan Jeannin. Lastly, it enters into the composition of modern furniture : not only pieces which are naturally glazed, such as bookcases, cabinets, glass cupboards, etc., but tables of all kinds. Thus, Emile Ruhlmann has designed for Mdlle. Jacqueline Francell an original and delightful dressing table, formed of small twin sets of drawers supporting a large kidney-shaped glass top, on which rests a triple mirror of circular shape. Another design—no less individual—of a dressing table with a glass top has been produced by Eugène Printz, which includes an axis of bronze aluminium, on which revolve three solid cylinders like muffs in gleaming plaques of plate glass ; at the top of the pivot are the wings of the mirror. This is a far cry from the eighteenth-century

toilet table, and even that of the Empire Period, with its hexagonal oblong mirror hinged on two supports.

The plate-glass top has become an essential element of small pieces of furniture, as, for example, in those by DIM, with their unusual intersections and unexpected divisions, and those constructed by Thonet of steel tubes and glass tops after the designs of André Lurçat. In the domain of larger pieces of furniture, René Lalique has executed dining-room tables formed of an immense bevelled slab, supported by twelve clusters of columns divided into two groups. At the 1925 Exhibition, Maurice Dufrène, who is at the present day responsible for interesting designs in small furniture, had executed for the dining-room of the La Maîtrise Pavilion a great table surmounted by a thick plate-glass top, with a groove across it, from which sprang a row of little fountains. Sabino, on the other hand, constructs tables and consoles of slabs of glass mounted on a metal framework. In this case glass is used as decoration rather than as part of the construction, but the idea is no less interesting.

What is of chief importance, as the present work has attempted to stress, is the underlying idea. It is right that clever and skilled craftsmen should reproduce from good models with sympathy and accuracy. Their professional honesty has a value of its own. They are an indispensable instrument in the formation of the masters. They are the good soil which nourishes the flowers. And it would be a total miscomprehension of the conditions of evolution in artistic craftsmanship to believe in the spontaneous production of masters. But the individual contribution to the common fund—that of the master—is none the less the only thing which is of any value, since it alone contains the principle of beauty—as opposed to the cult of the difficult pursued by simple craftsmen —the idea.

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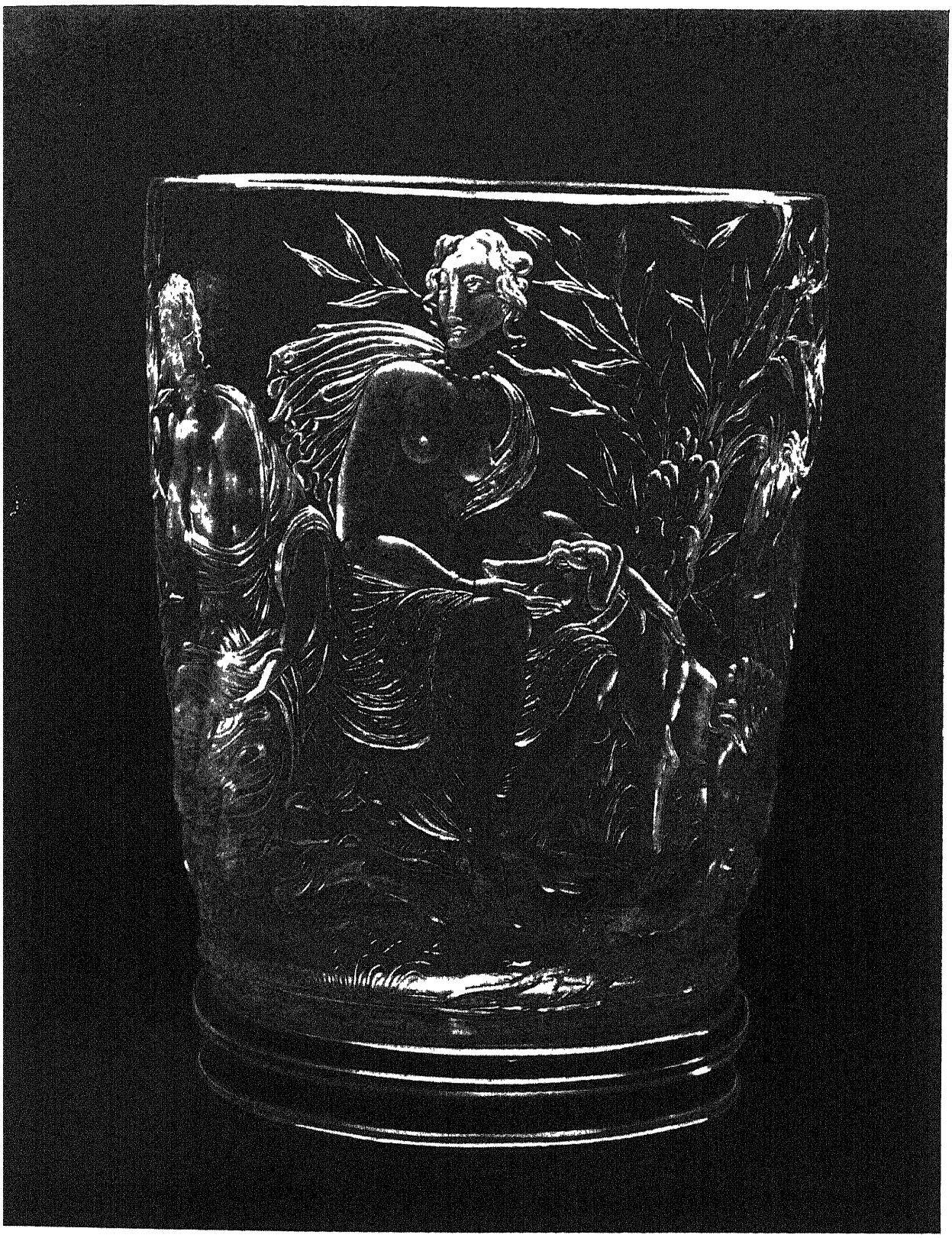
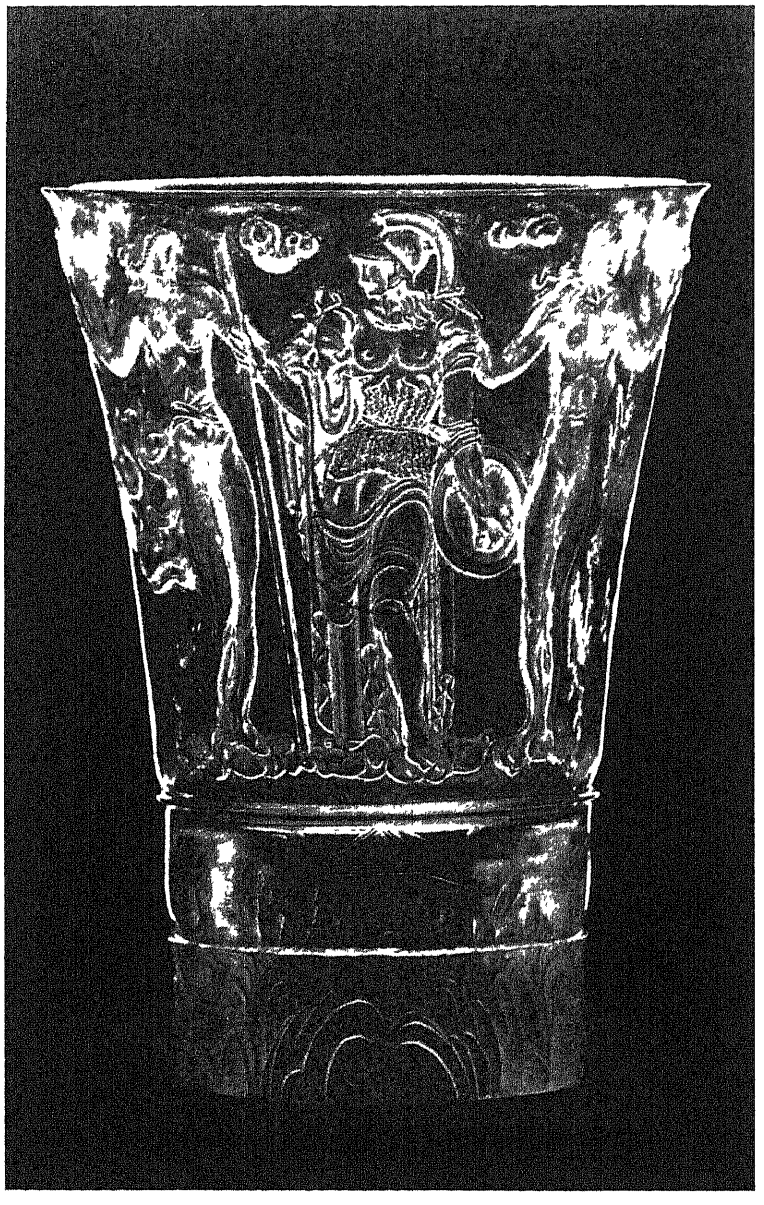


J. & L. LOBMEYR, VIENNA: ENGRAVED CRYSTAL VASE, DESIGNED BY ENA ROTTENBERG



J. & L. LOBMEYR, VIENNA' CAMEO ENGRAVED CRYSTAL VASE, DESIGNED BY JAROSLAV HOREJC

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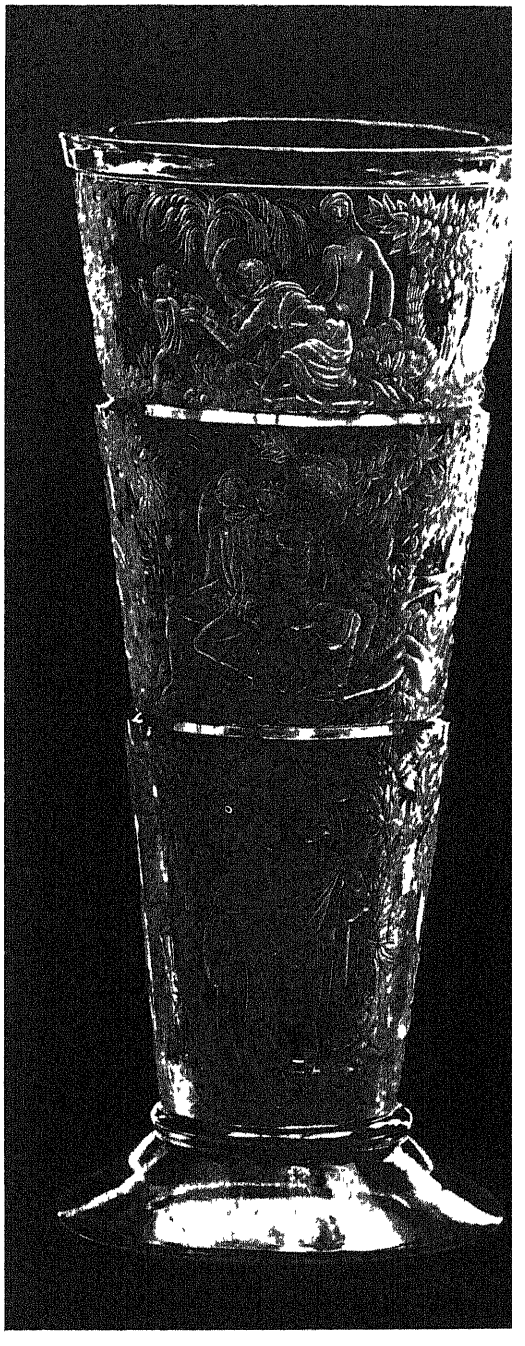
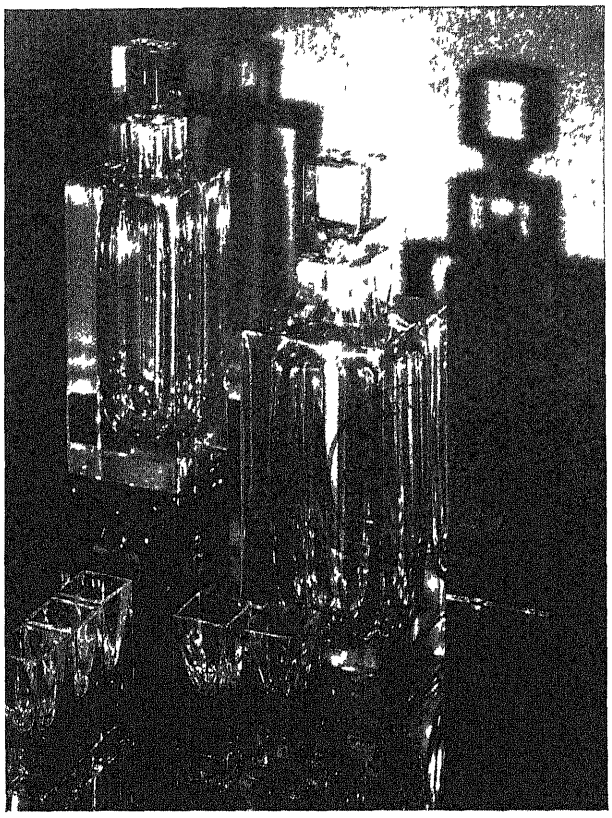
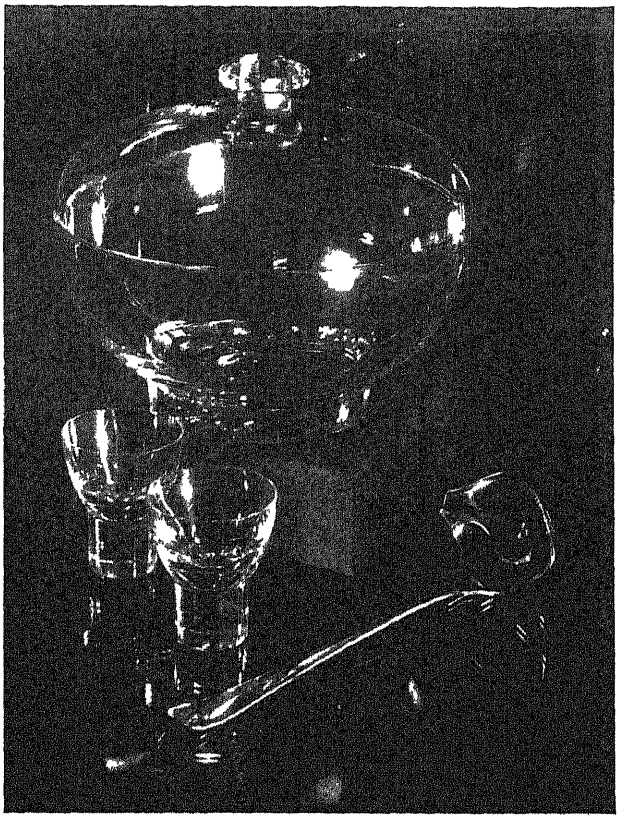
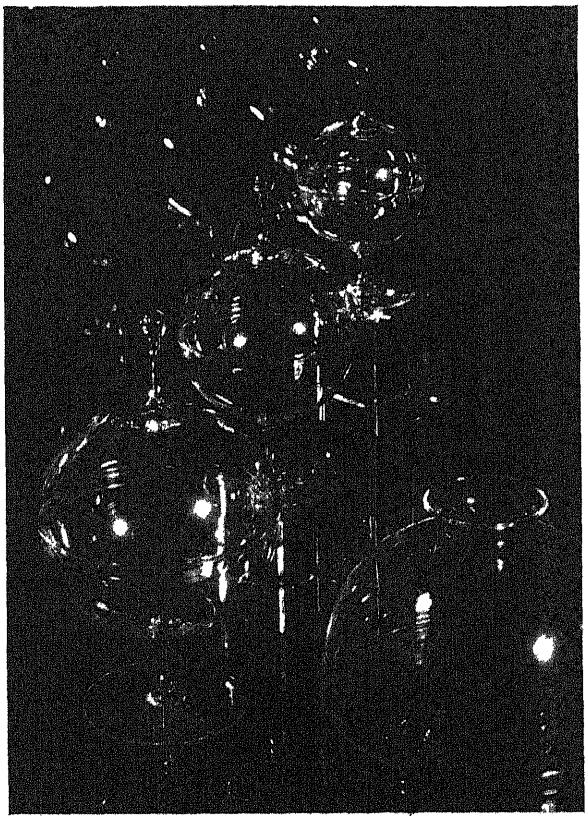
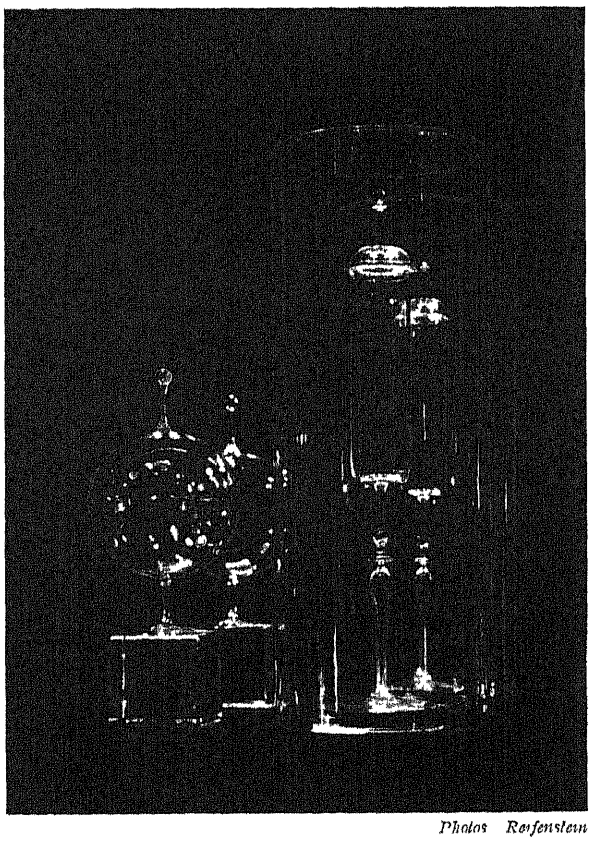




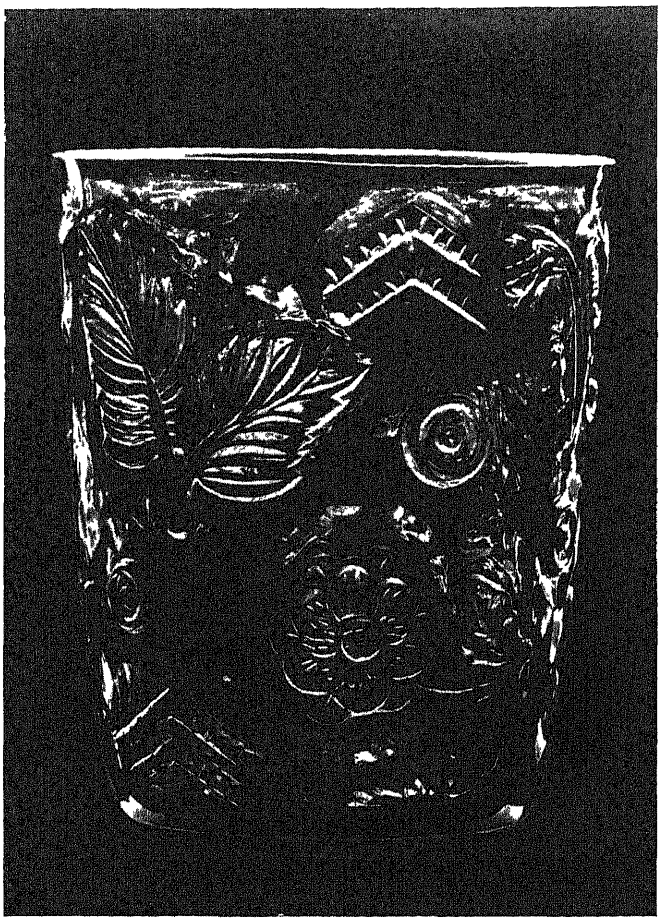






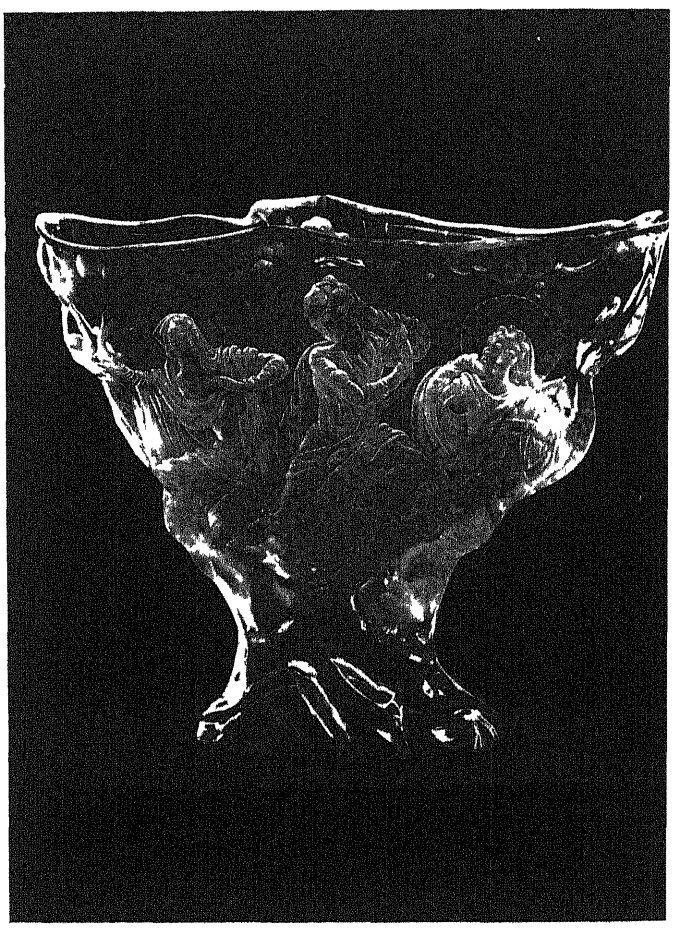
*Photos Rosenstein*

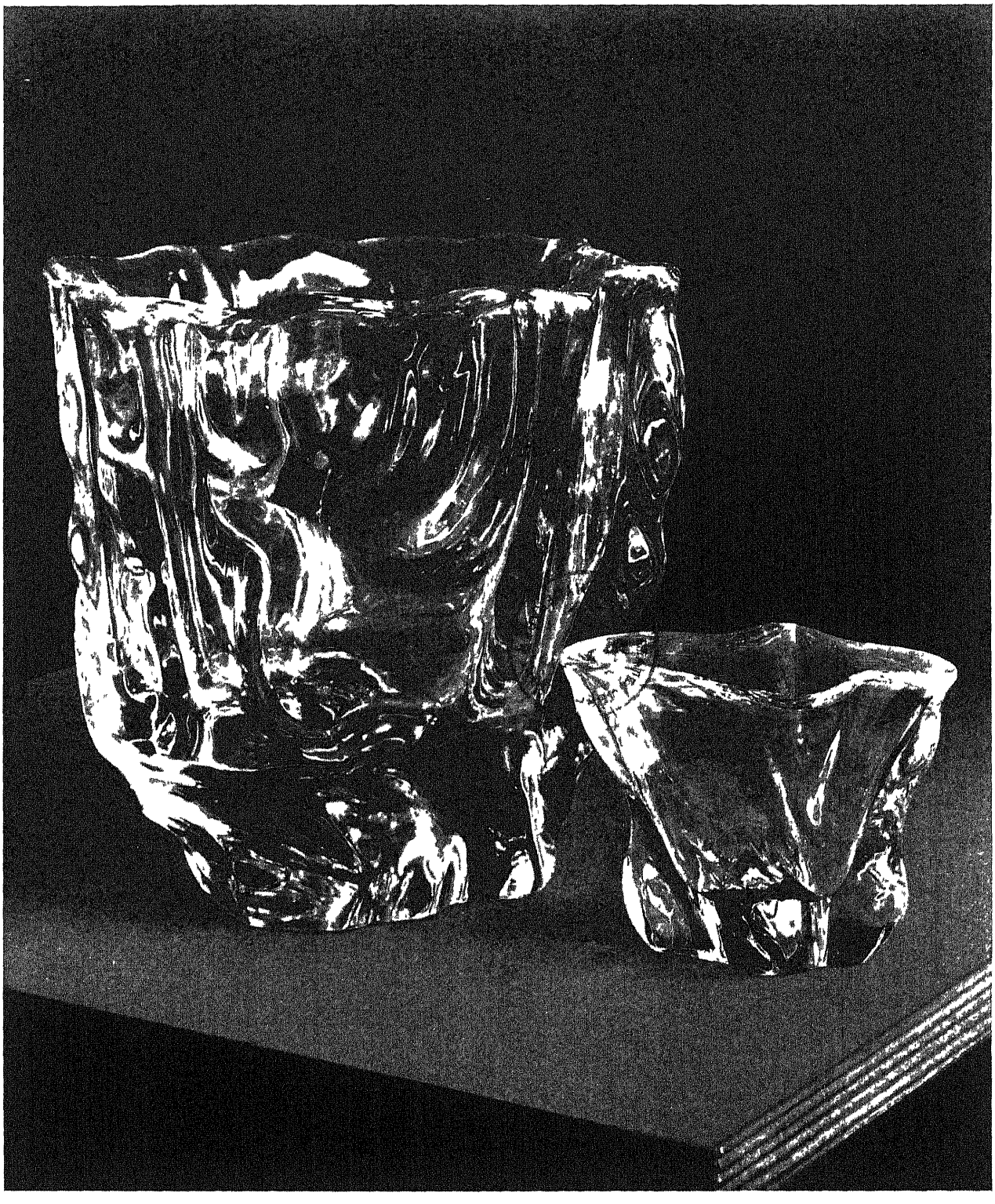
J. & L. LOBMEYR, VIENNA: BLOWN AND CUT CRYSTAL. "MUSLIN" GLASS SETS, DESIGNED BY OSWALD HAERDTL (BELOW)



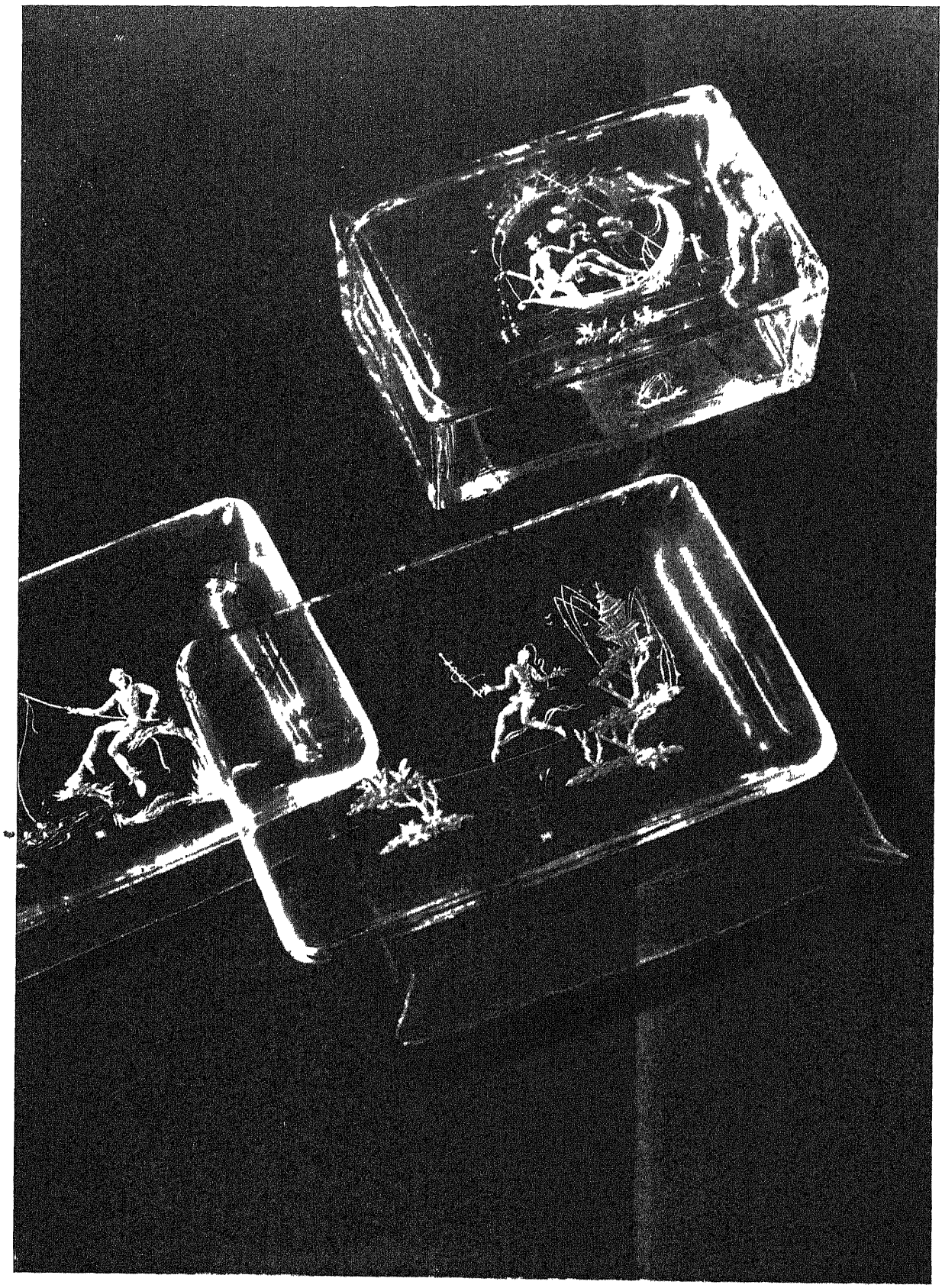
J & L LOBMEYR, VIENNA TOPAZ COLOURED BLOWN CRYSTAL VASE, WITH CAMEO ENGRAVING, DESIGNED BY MICHAEL POWOLNY

J & L LOBMEYR, VIENNA CRYSTAL BOWL SHAPED WHILE HOT, WITH ENGRAVING DESIGNED BY ENA ROTTENBERG

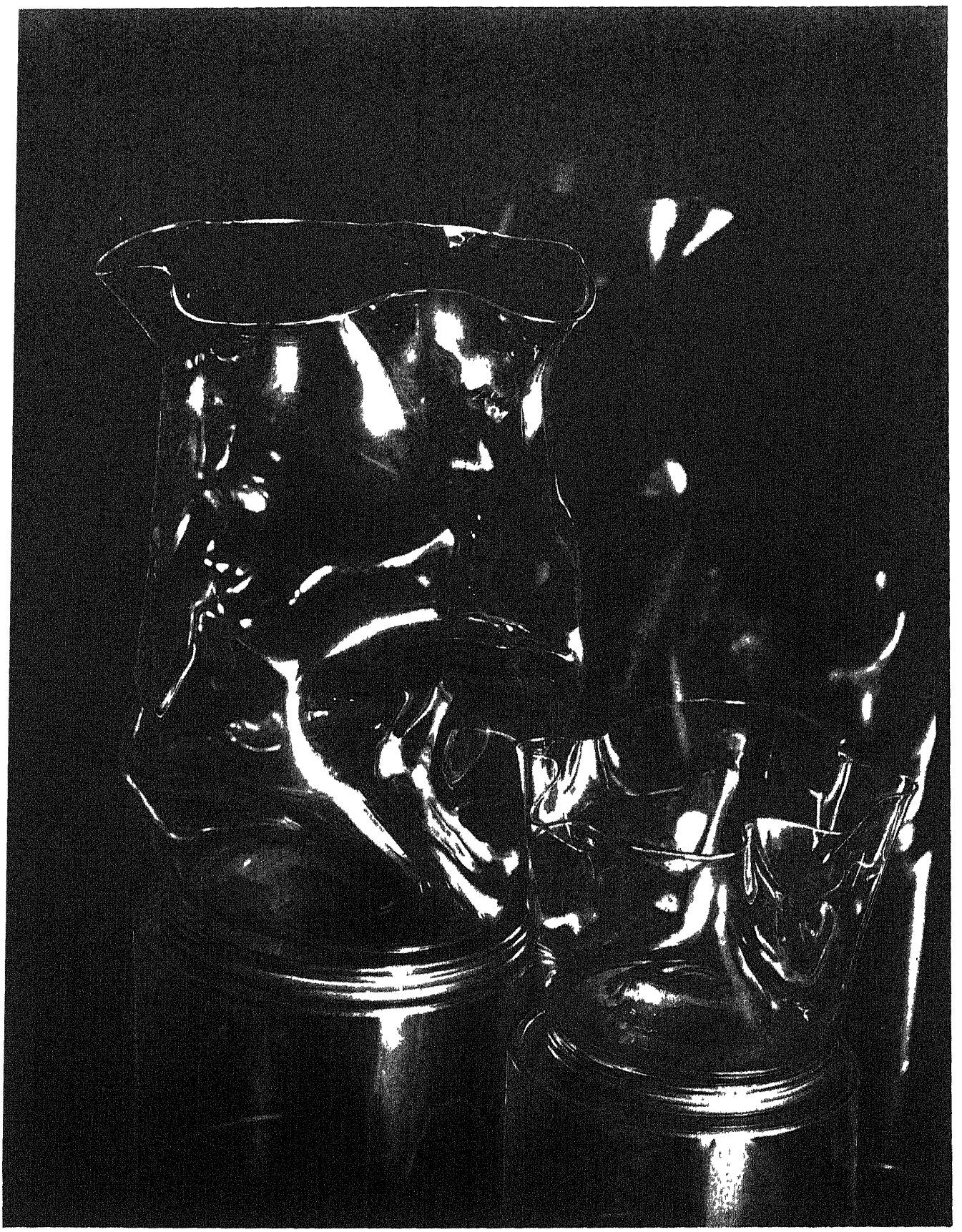




J & L LOBMEYR, VIENNA · IRREGULARLY CUT CRYSTAL VASES, DESIGNED BY ·ENA ROTTENBERG AND MARIANNE RATH



J. & L. LOBMEYR, VIENNA: CRYSTAL TRAYS, WITH ENGRAVING, DESIGNED BY RUDOLF ROTHEMUND



J. & L. LOBMEYR, VIENNA: VASES SHAPED WHILE HOT

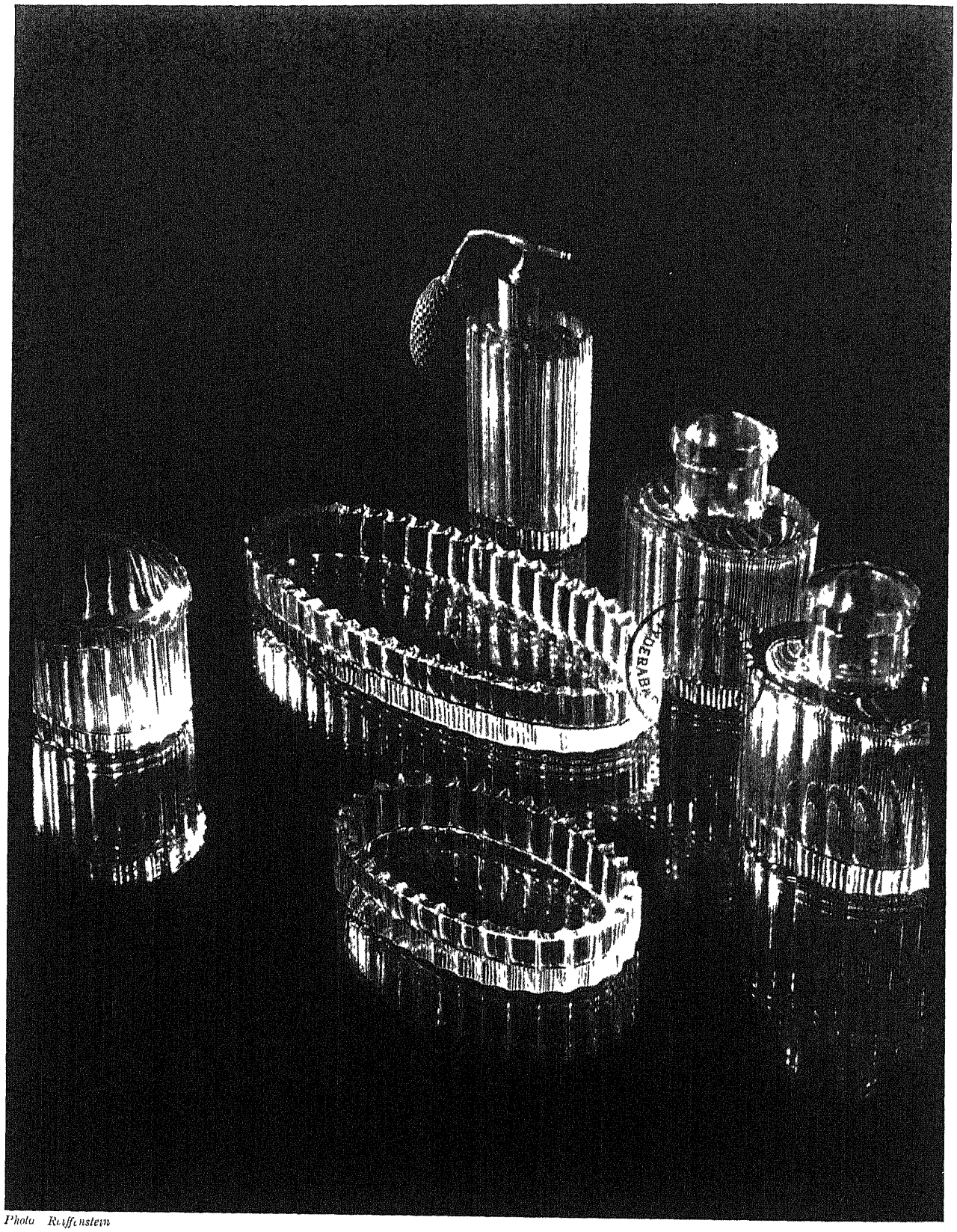
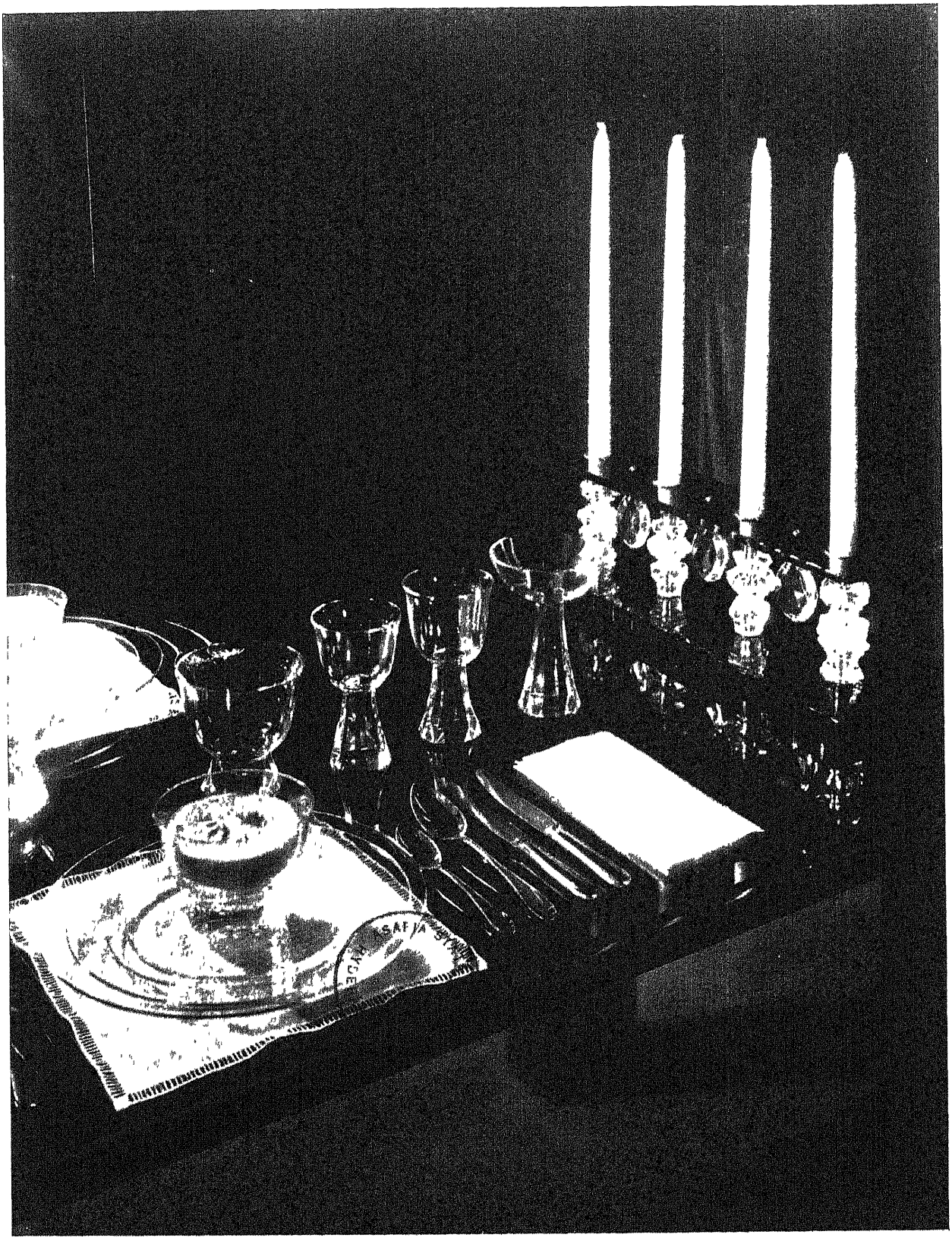
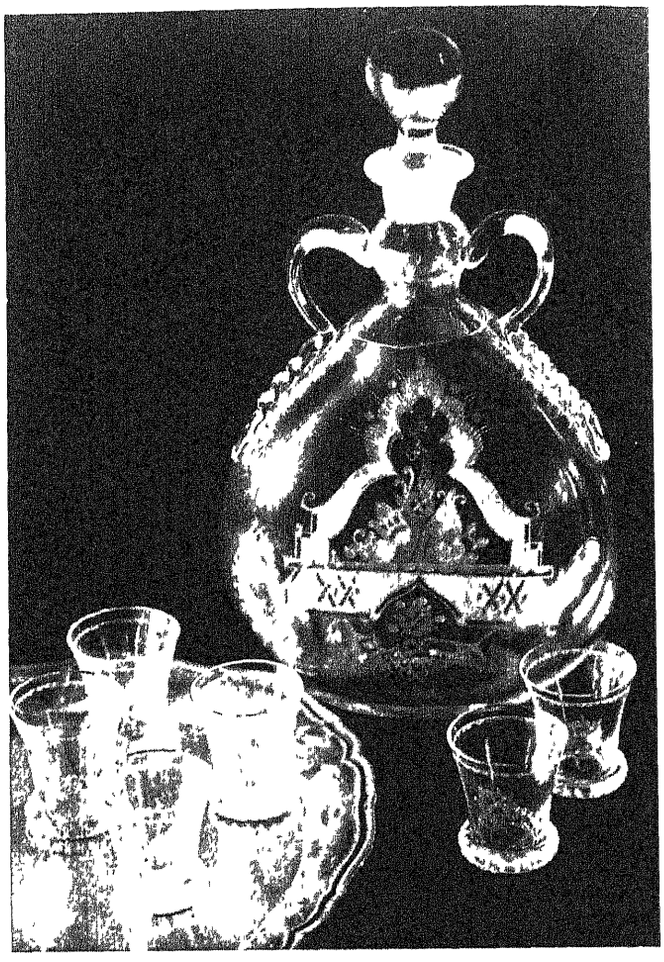


*Photo Reiffenstein*

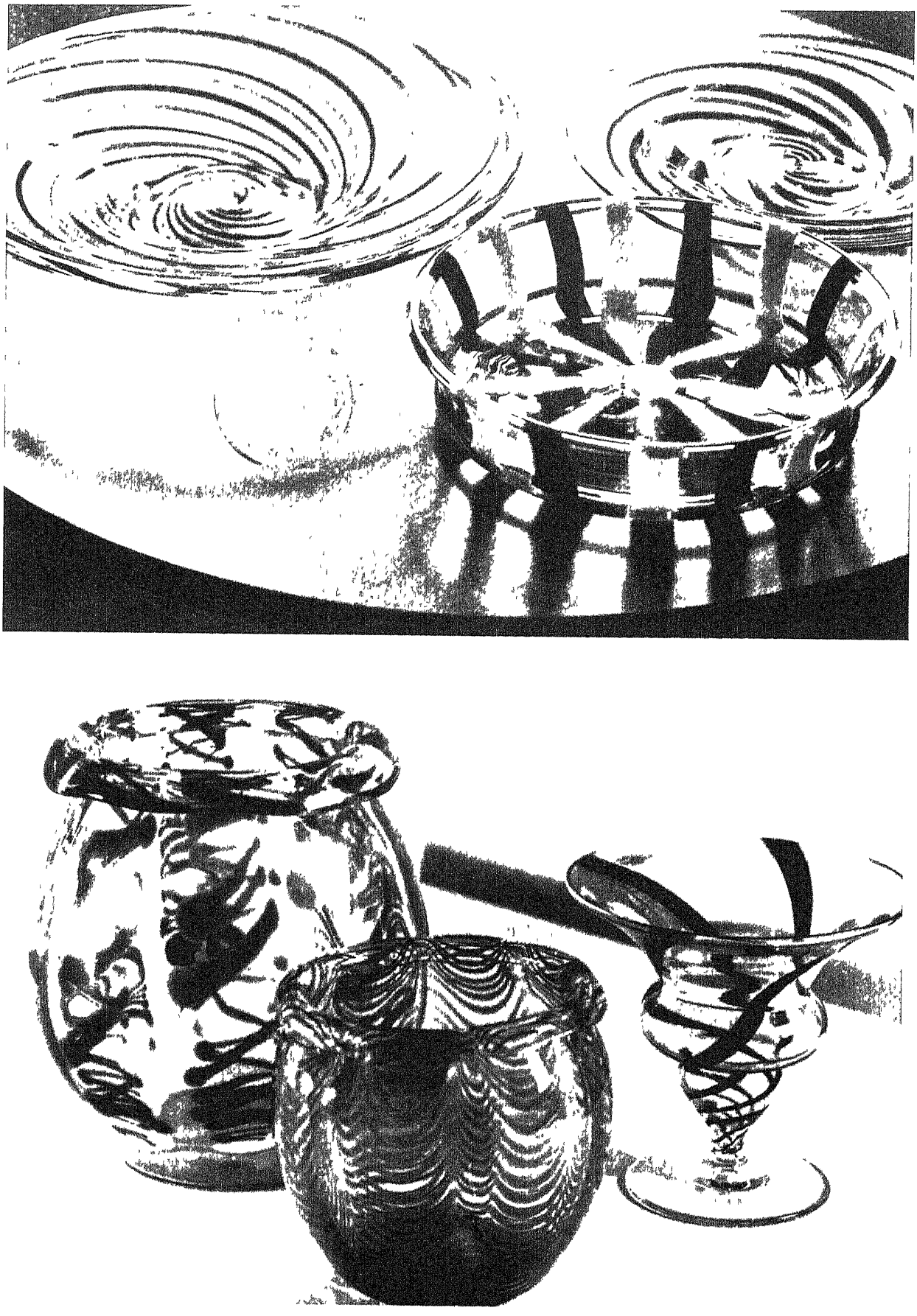
J. & L. LOBMEYR, VIENNA: CUT CRYSTAL TOILET SET



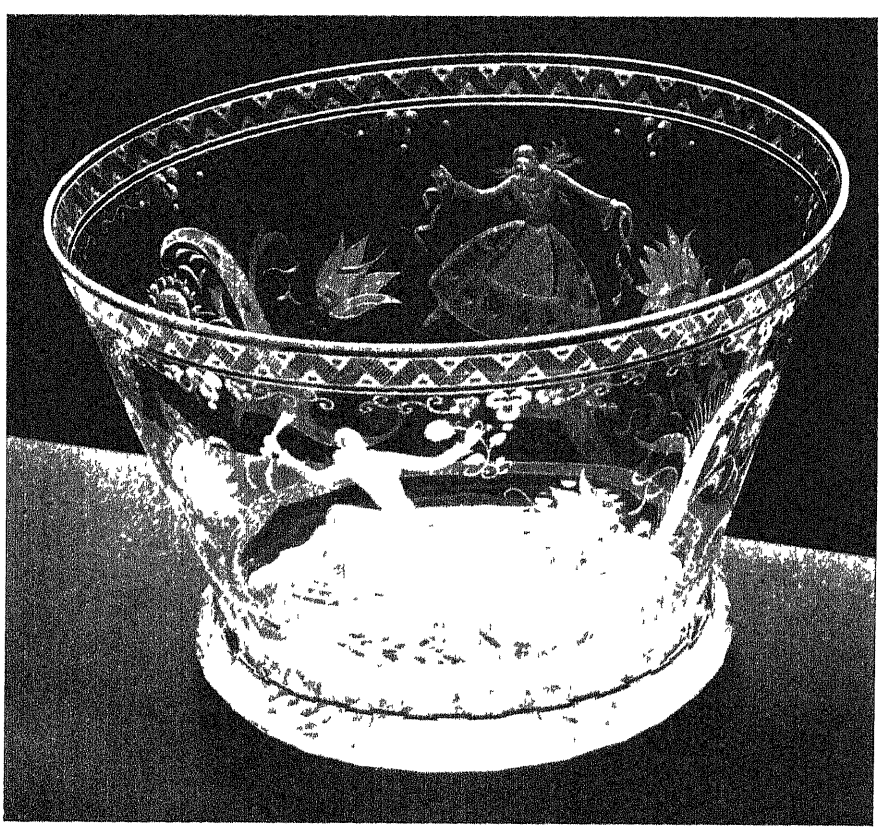
J & L LOBMEYR, VIENNA: TABLE GLASS, DESIGNED BY J E WIMMER

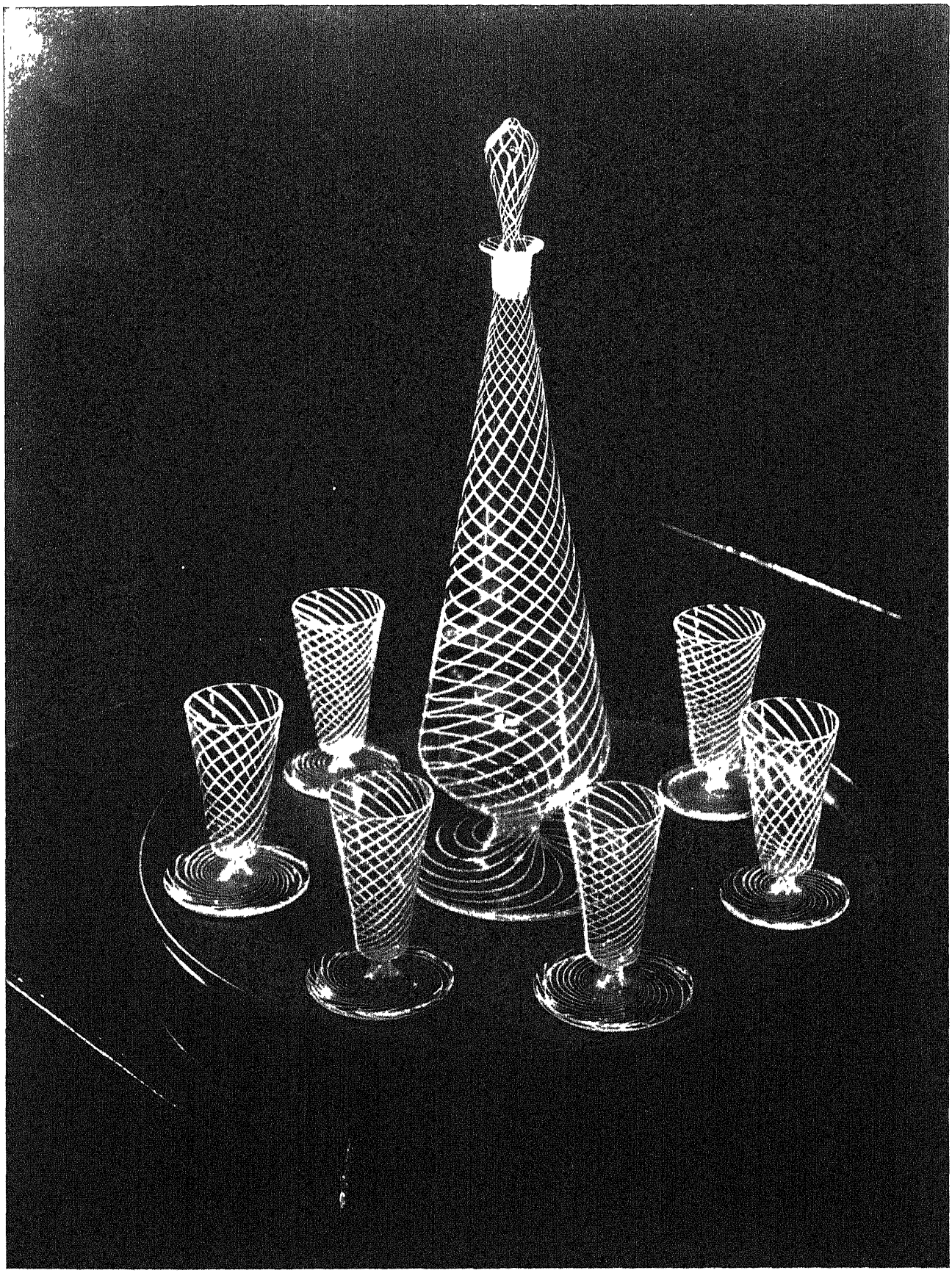
TIROLER GLASHUTTE, TYROL WHITE CRYSTAL LIQUEUR SETS, WITH COLOURED DECORATIONS IN TYROLESE PEASANT STYLE, DESIGNED BY PROFESSOR PFERSCHY, BOLZANO



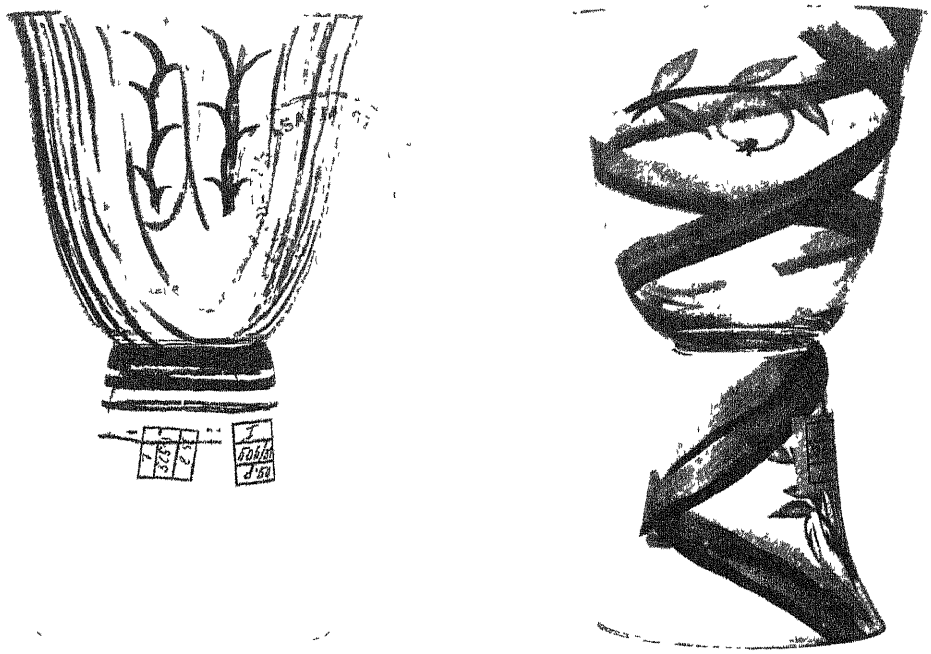
TIROLER GLASHUTTL, TYROL: GLASS DISHES SHAPED WHILE HOT, DECORATED IN CORAL, WHITE, BLUE AND LILAC (ABOVE) SPUN GLASS VASES (BELOW)



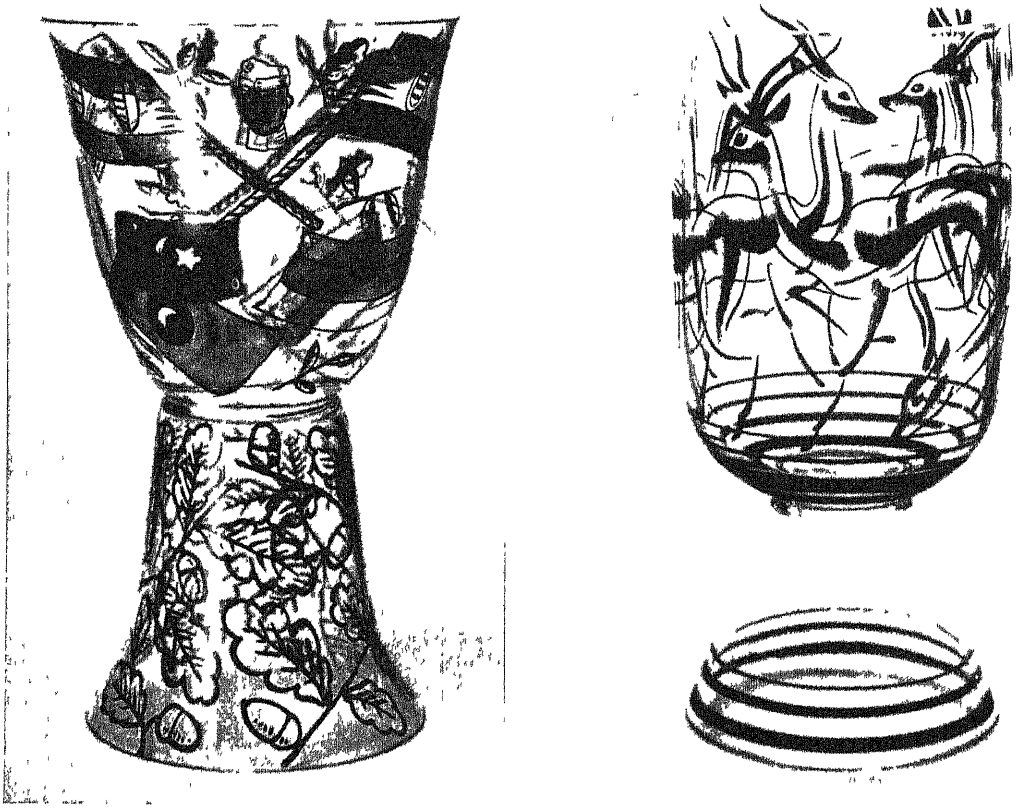
TIROLER GLASHUTTE, TYROL WHITE CUT CRYSTAL, WITH ENGRAVING, DESIGNED BY PROFESSOR PEERSCHY, BOLZANO



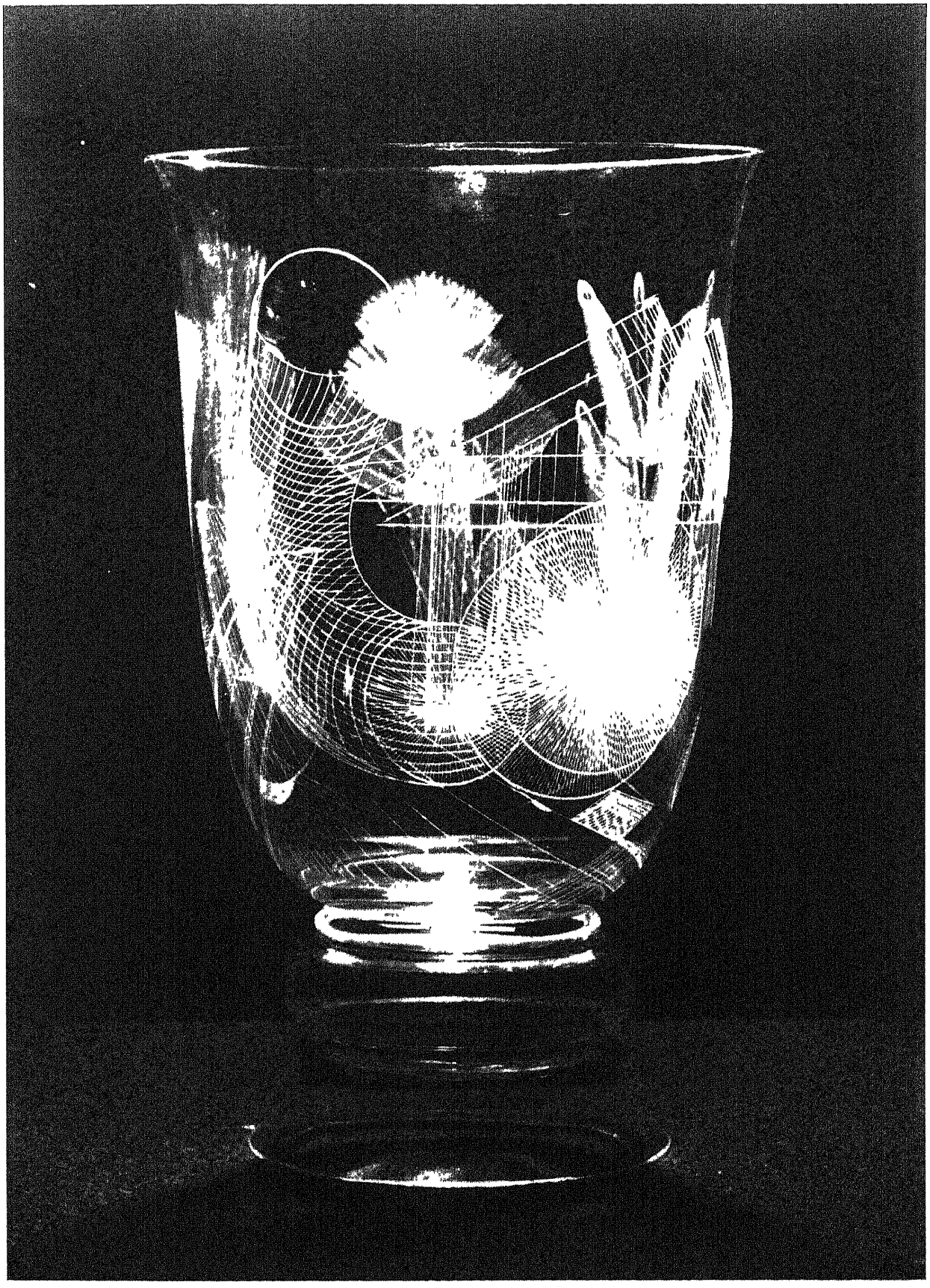
BIMINI WERKSTATTEN, VIENNA. BLOWN GLASS LIQUEUR SET, WITH WHITE THREAD, DESIGNED BY ARTUR BERGER



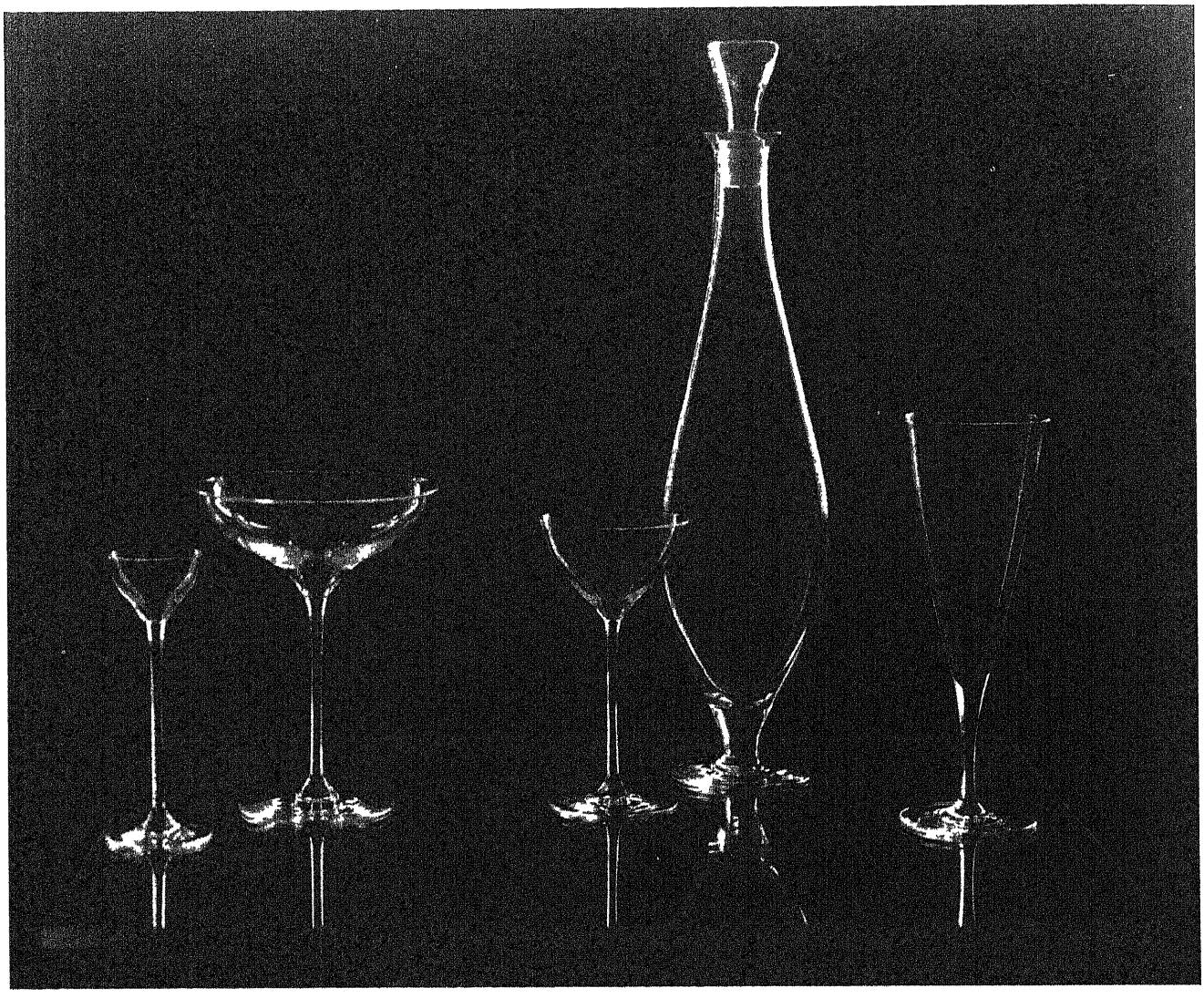
WIENER WERKSTAETTE, VIENNA GLASS CUPS, DESIGNED BY JOSEF HOFFMANN, PAINTED BY DAGOBERT PECHE



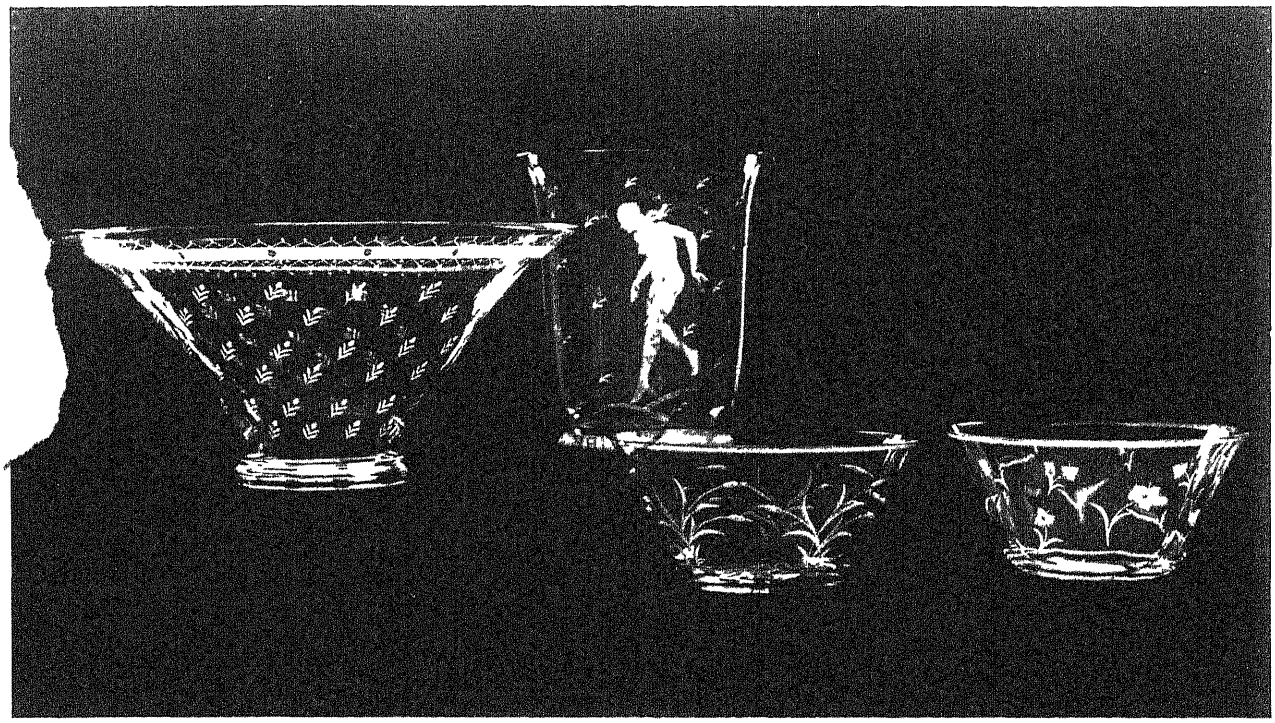
WIENER WERKSTAETTE, VIENNA CUP DESIGNED BY JOSEF HOFFMANN, PAINTED BY IRENE SCHASCHL (ON LEFT). ORREFORS GLASBRUK, SWEDEN PAINTED CUP (ON RIGHT)



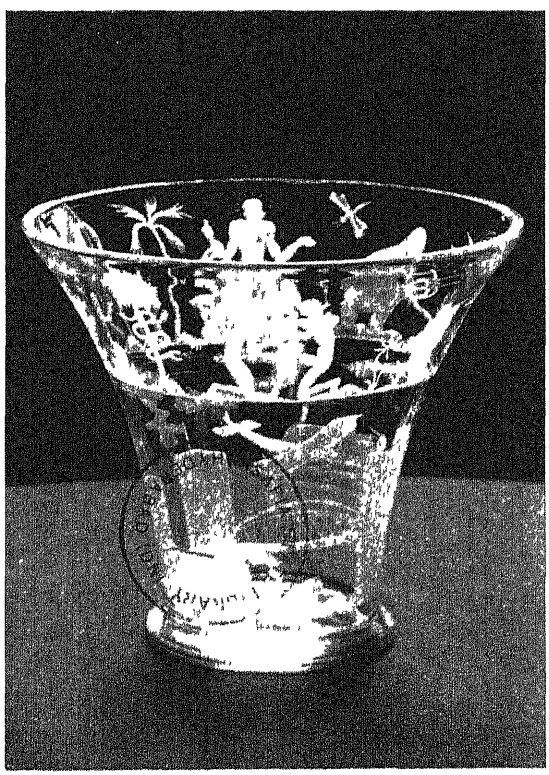
A. P. WITT, KARBITZ, CZECHOSLOVAKIA. ENGRAVED GLASS GOBLET



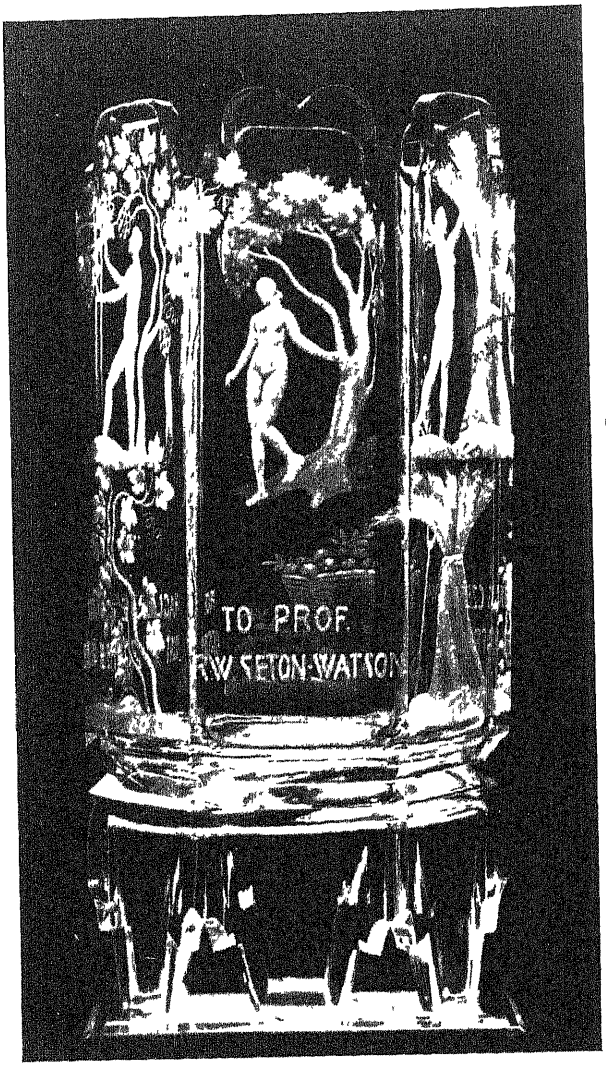
A. MLTFLAK, ZELEZNY BROD TECHNICAL SCHOOL. TABLE GLASS, PRODUCED BY JOS. INWALD, A.S.

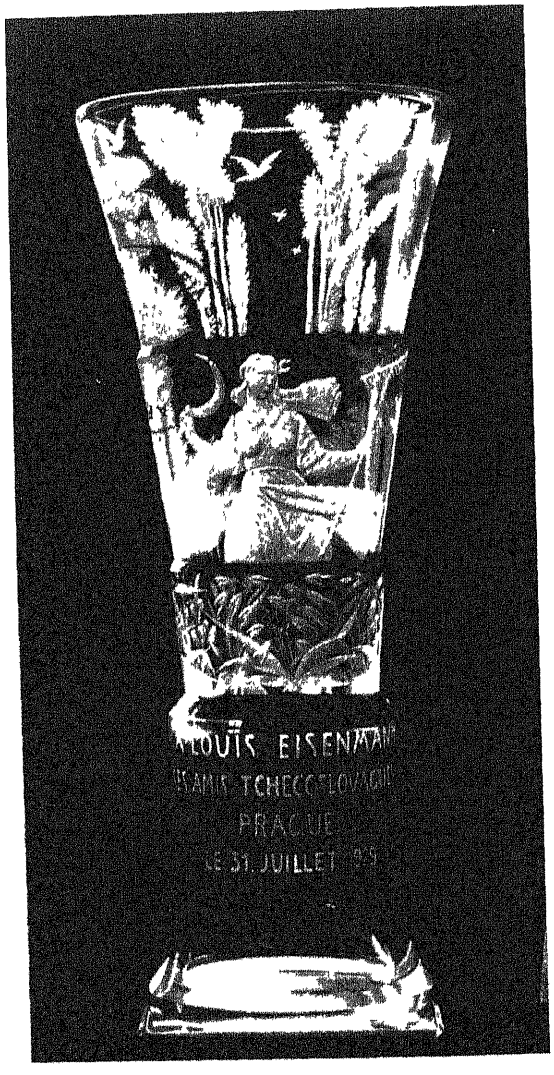


EMIL SPRACHTL, PRAGUE VASE AND BOWLS IN CUT AND ENGRAVED CRYSTAL

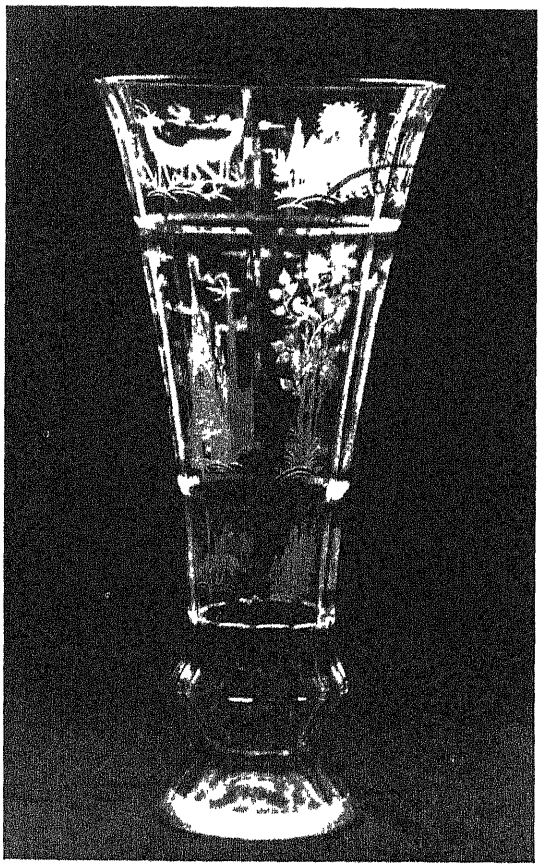


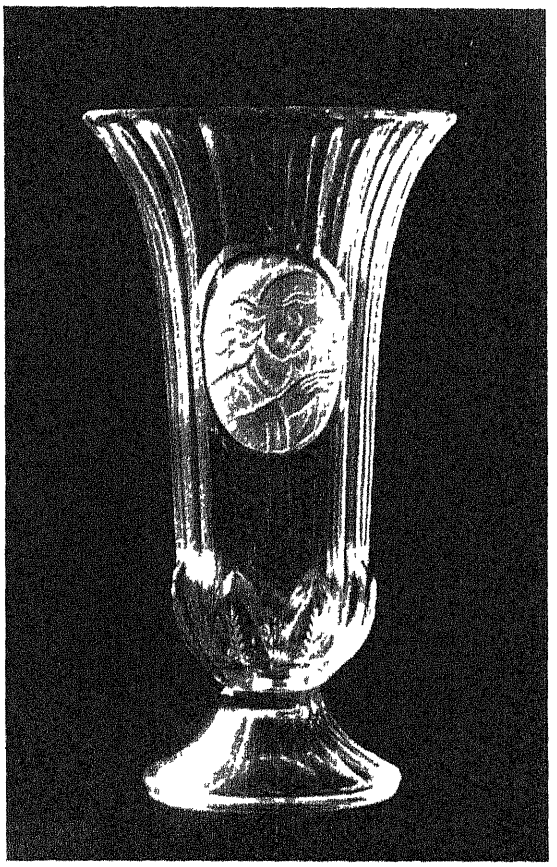
DRICH ZAK, ZELEZNY BROD. ENGRAVED GLASS VASE, "THE CREATION"



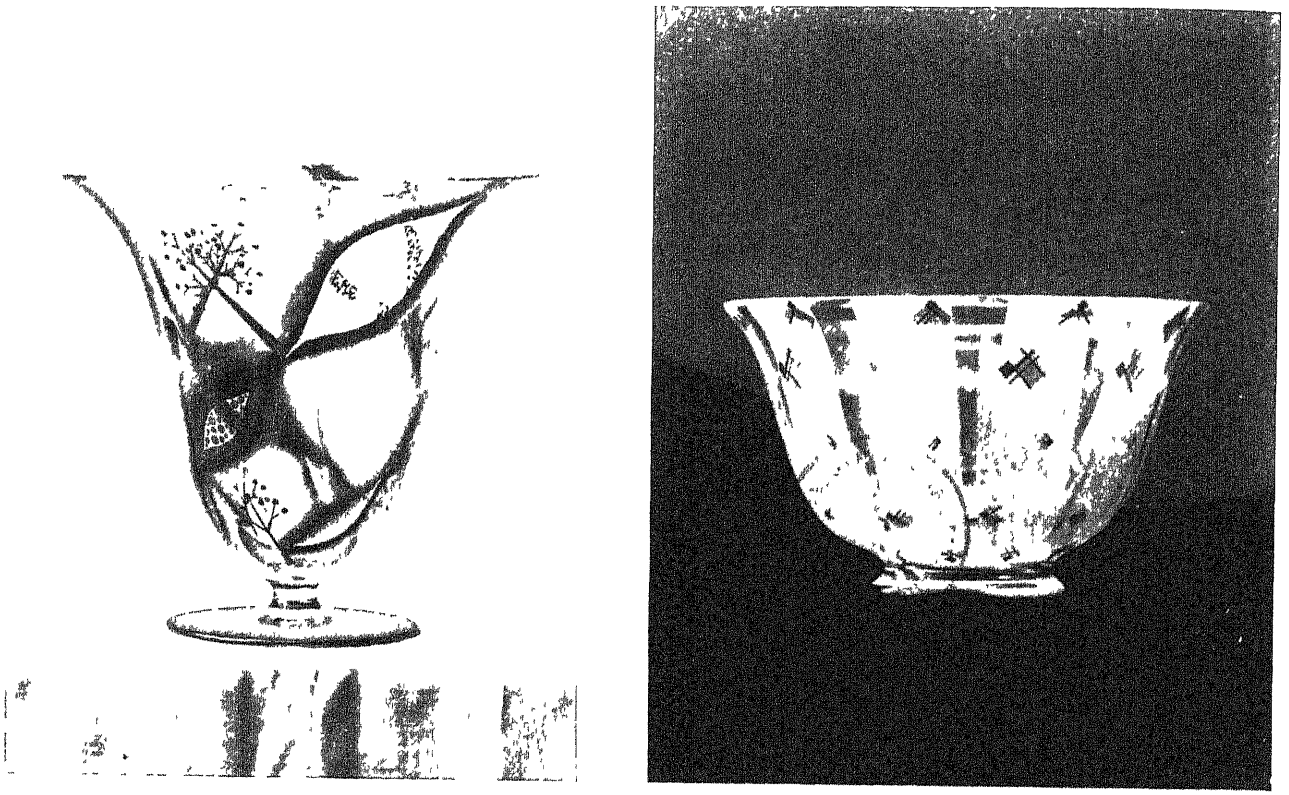




JOSEF DRAHONOVSKY, PRAGUE. COMMEMORATIVE GOBLETS IN ENGRAVED GLASS

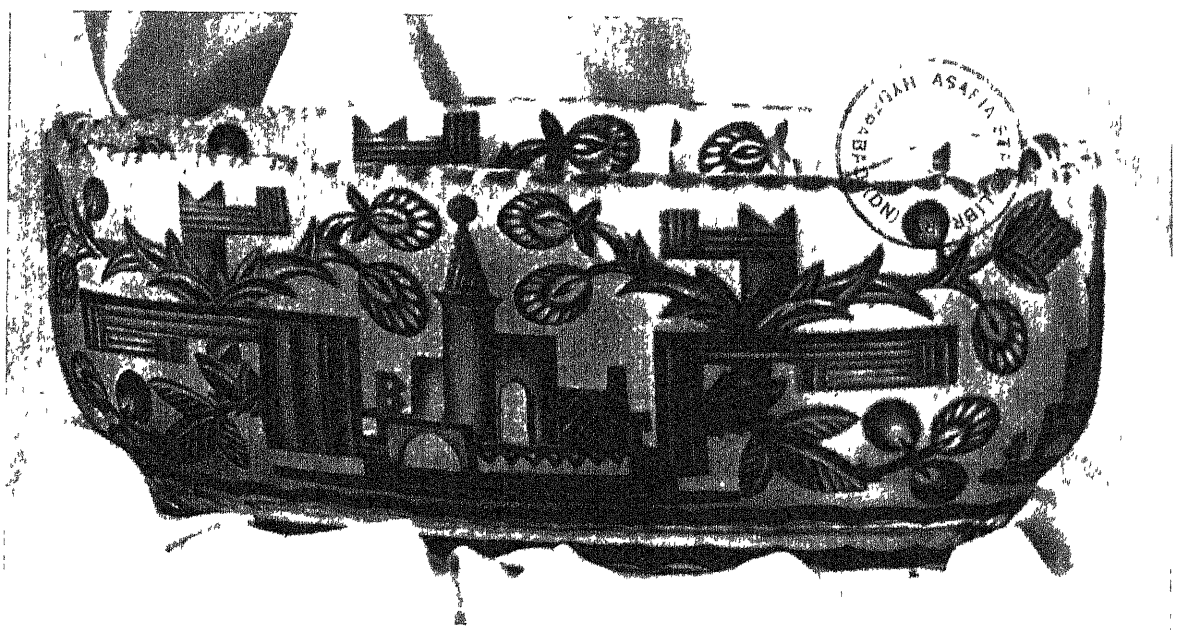




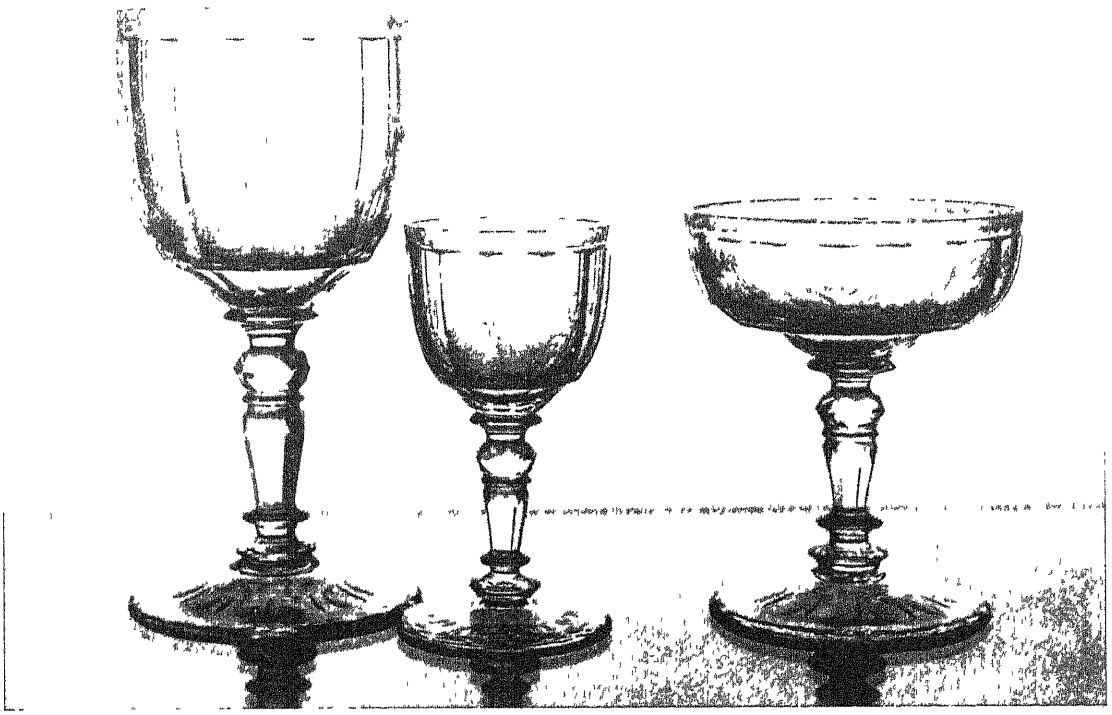
LADISLAV PRENOSYL, ZELEZNY BROD: ENGRAVED GLASS DISH AND VASES



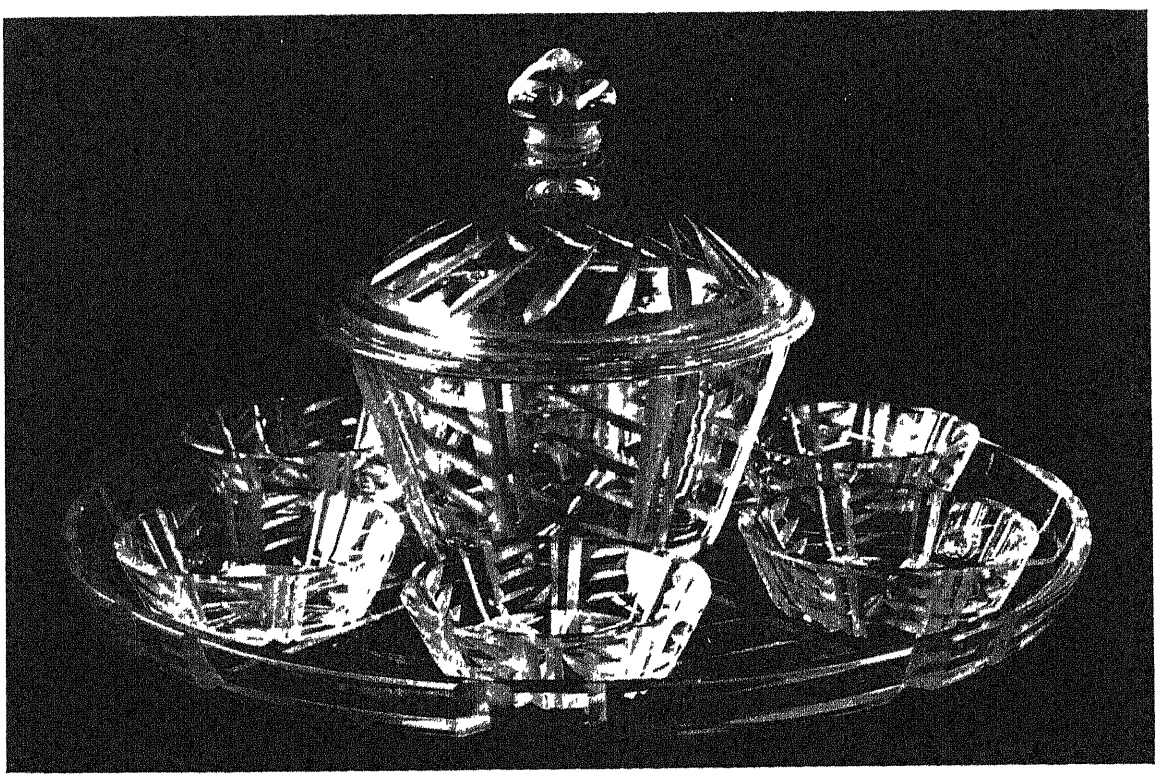
PROFESSOR PLOHL, ZELEZNY BROD TECHNICAL SCHOOL ENAMELLED CRYSTAL VASE (ON LEFT) JABLONEC TECHNICAL SCHOOL BOWL ENGRAVED WITH ACID AND ENAMELLED (ON RIGHT)



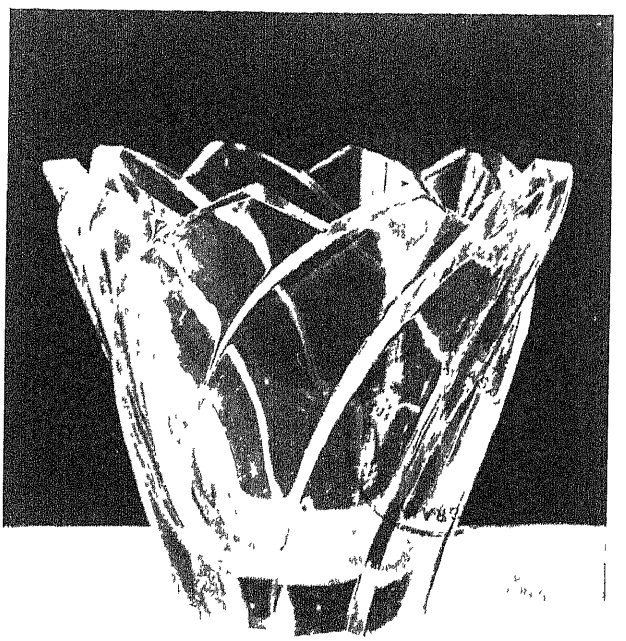
JOH. OERTEL & CO., BOR HAIDA. FLUSHED GLASS BOWL WITH ENGRAVING



MOSER CRYSTAL GLASSWORKS WINE GLASSES IN CUT AND ENGRAVED COLOURED CRYSTAL

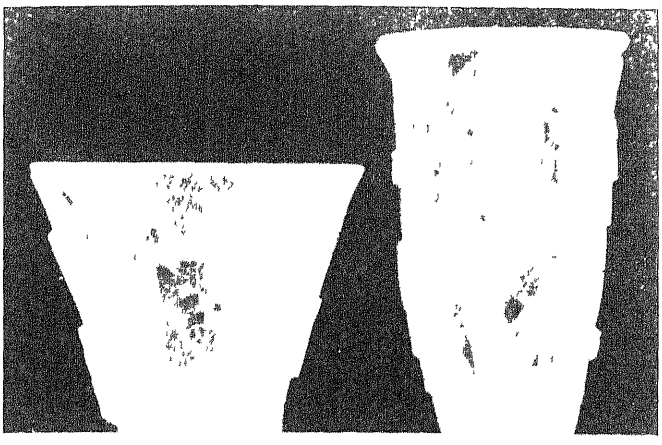


RUCKL, NIZBOR ENGRAVED CRYSTAL BONBONNIÈRE



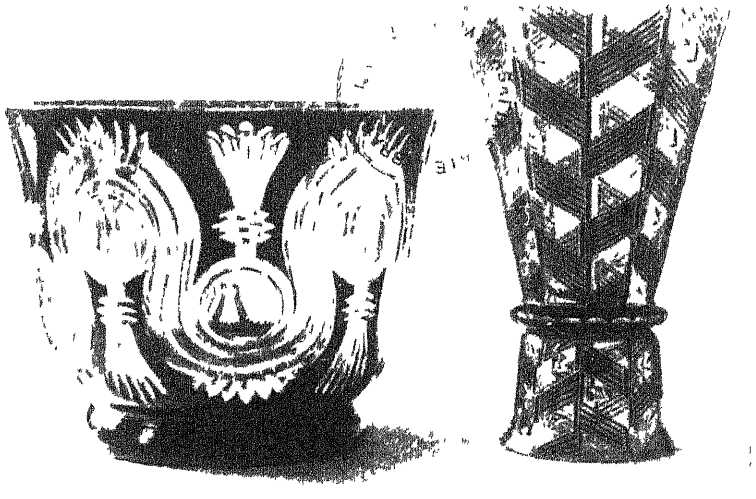
*Steinschönau Technical School*

CUT CRYSTAL VASES DESIGNED BY PROFESSOR DORN'S DEPARTMENT, EXECUTED IN KRAUSE'S DEPARTMENT

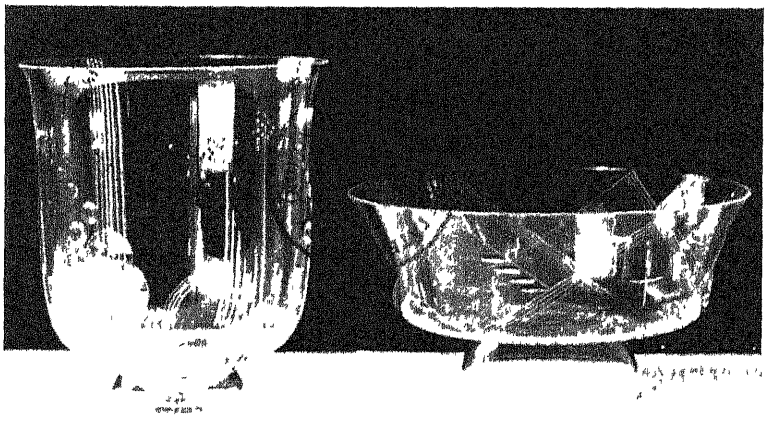


## *Steinschönau Technical School*

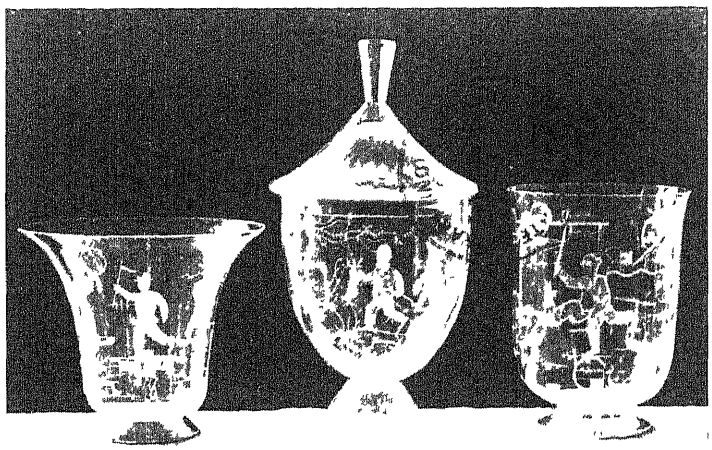
LEAD CRYSTAL VASES, ENGRAVED BY ACID AND SAND-BLASTING, DESIGNED BY PROFESSOR DORN'S DEPARTMENT, EXECUTED BY E. KROMER'S DEPARTMENT



BLUE FLUSHED CRYSTAL BOWL (ON LEFT) PAINTED AND ENGRAVED CRYSTAL VASE (ON RIGHT) DESIGNED BY PROFESSOR DORN'S DEPARTMENT, EXECUTED BY EDSEL E. KROMER

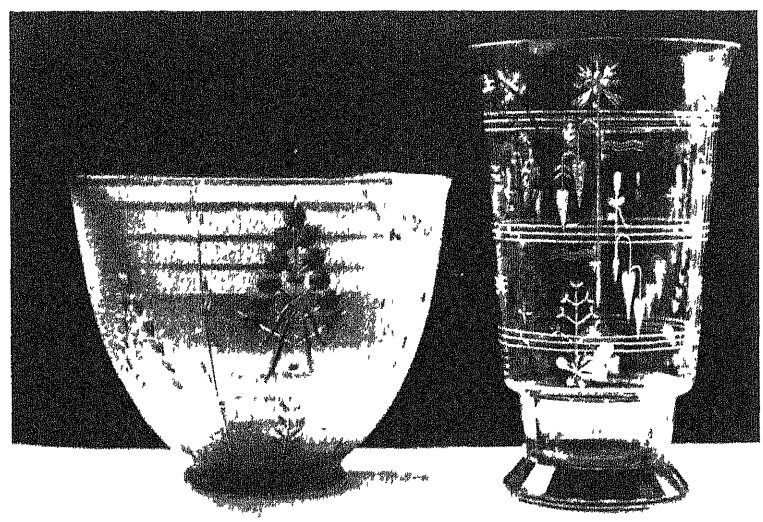


ENGRAVED HELIOLITH VASE AND ENGRAVED CRYSTAL BOWL, DESIGNED AND EXECUTED BY E. KROMER



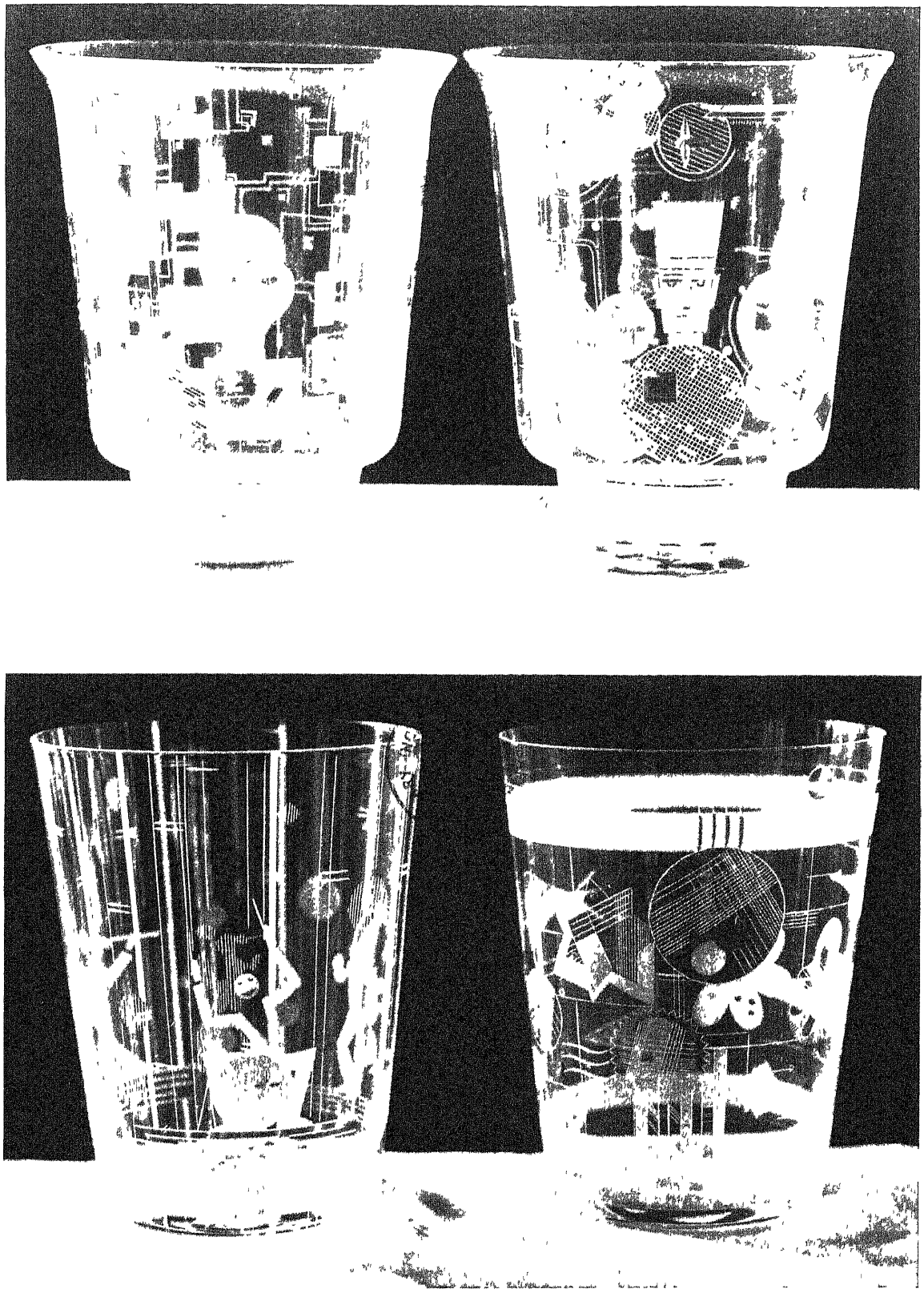
## *Steinschönau Technical School*

ENGRAVED CRYSTAL VASES WITH SILVER AND GOLD BASES. DESIGNED BY PROFESSOR DORN'S DEPARTMENT, EXECUTED BY F. KROMER'S DEPARTMENT

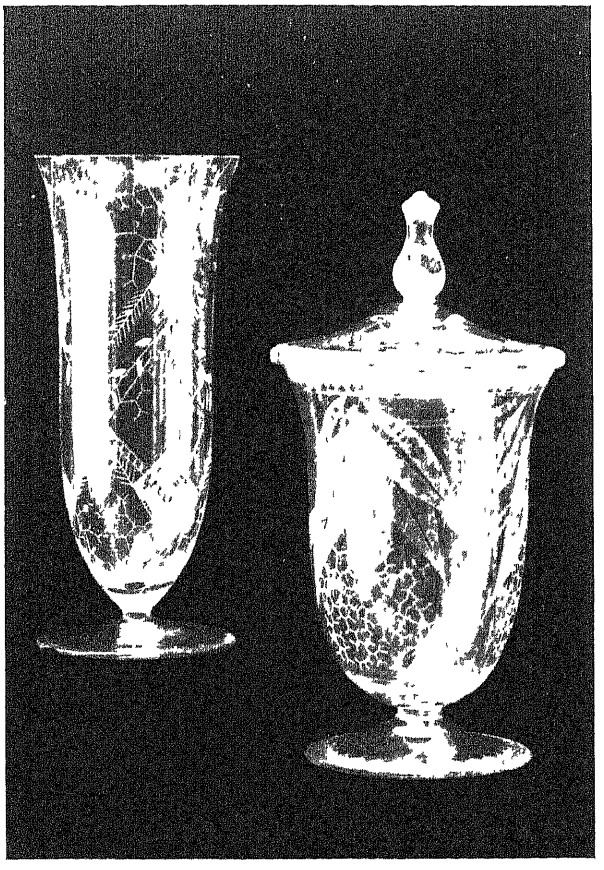


ANTIQUE CRYSTAL BOWL, ENGRAVED BY ACID AND SAND-BLASTING (LEFT) ANTIQUE CRYSTAL VASE, ENGRAVED (RIGHT) DESIGNED BY PROFESSOR DORN'S DEPARTMENT, EXECUTED BY F. KROMER'S DEPARTMENT

(1) ENGRAVED "ALEXANDRIT" VASE DESIGNED BY PROFESSOR DORN'S DEPARTMENT, EXECUTED BY F. KROMER'S DEPARTMENT (2) ENGRAVED CUP IN ANTIQUE CRYSTAL, DESIGNED AND EXECUTED IN F. KROMER'S DEPARTMENT (3) ENGRAVED HELIOLITH VASE, DESIGNED BY PROFESSOR DORN'S DEPARTMENT, EXECUTED BY F. KROMER'S DEPARTMENT

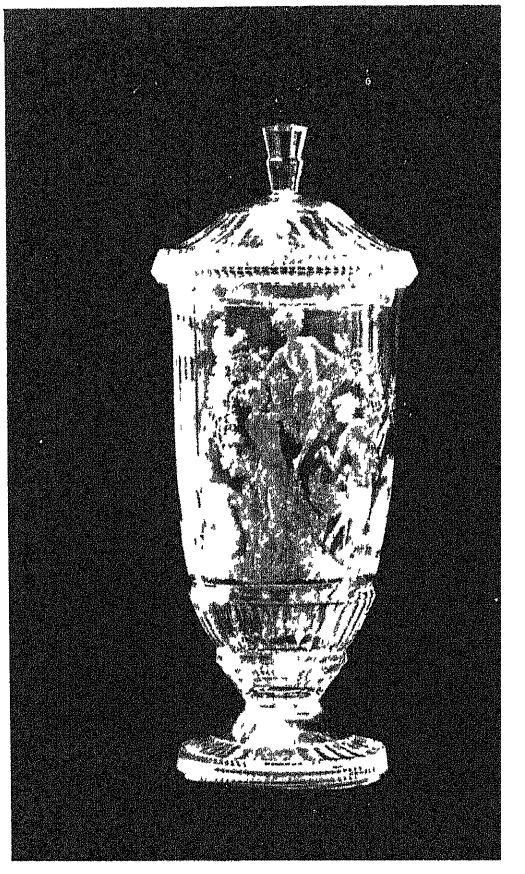


STEINSCHONAU TECHNICAL SCHOOL. ENGRAVED CRYSTAL VASES, DESIGNED AND EXECUTED IN THE DEPARTMENTS OF PROFESSOR DORN AND E. KROMER

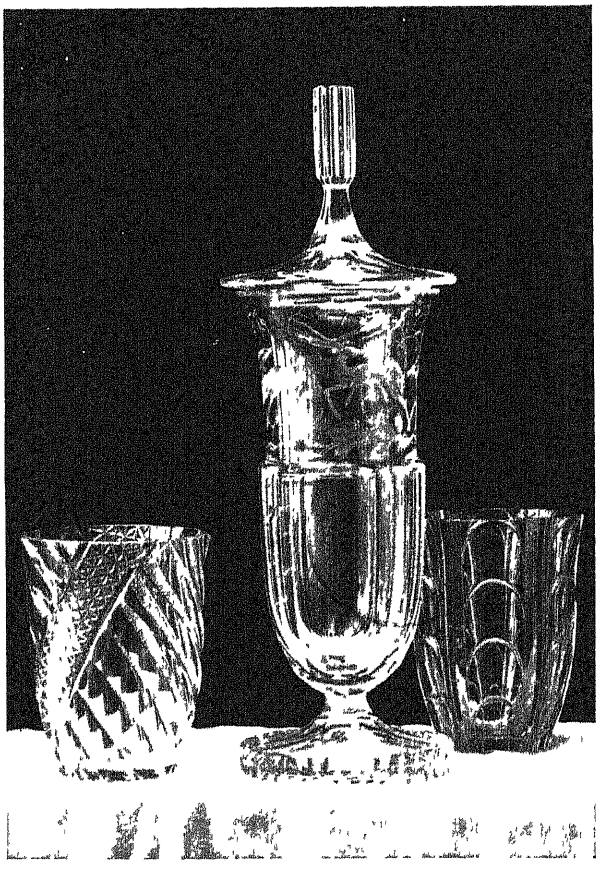


## *Bor Haida Technical School*

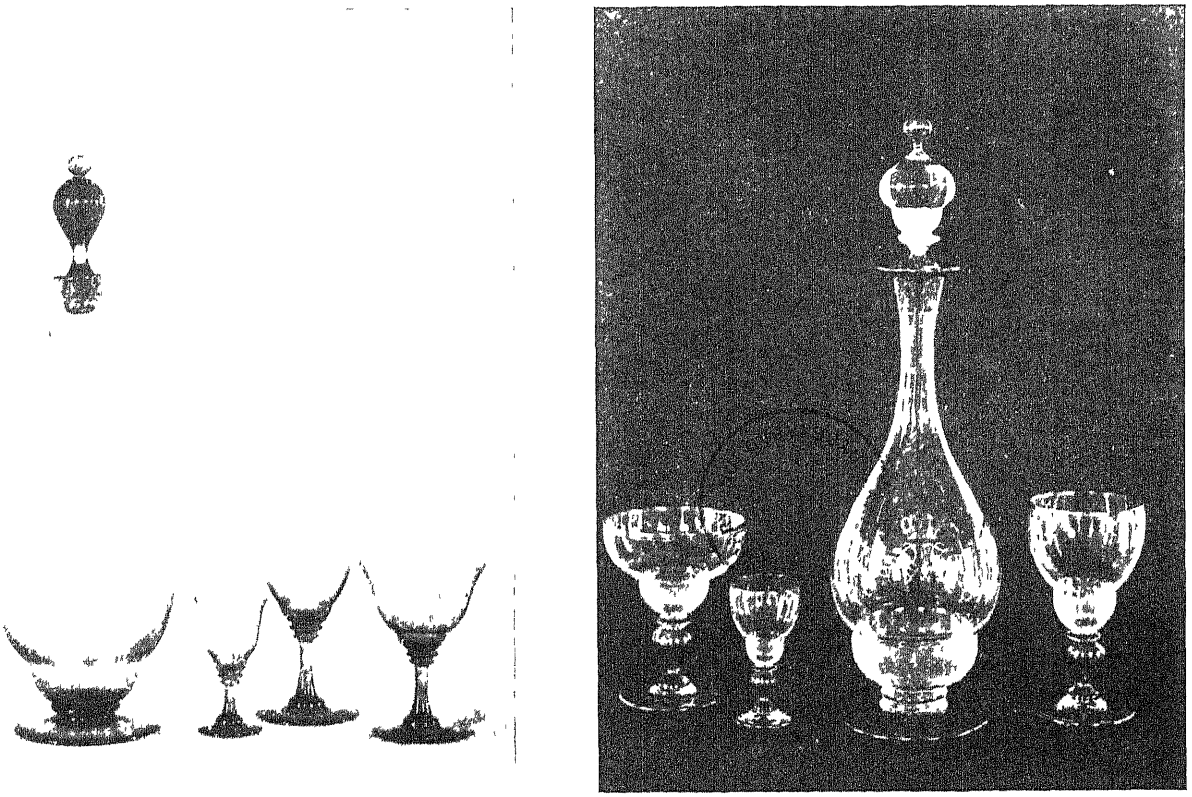
VASE AND GOBLET IN ENGRAVED CRYSTAL DESIGNED BY PROFESSOR PEOHL'S DEPARTMENT, EXECUTED BY HESLET'S DEPARTMENT



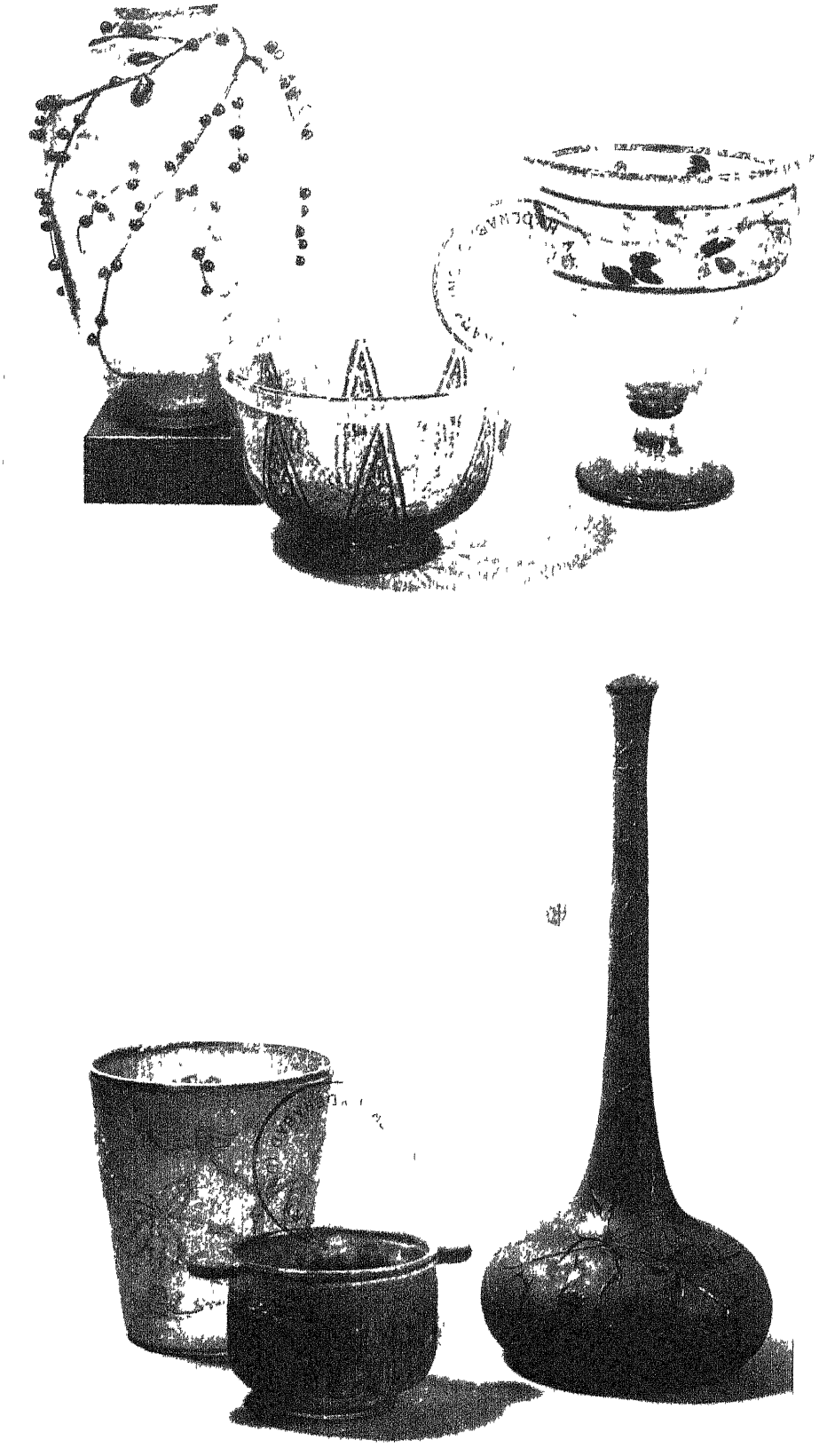
ENGRAVED GOBLET DESIGNED BY R. CISEK. ENGRAVING EXECUTED BY SCHROTTER



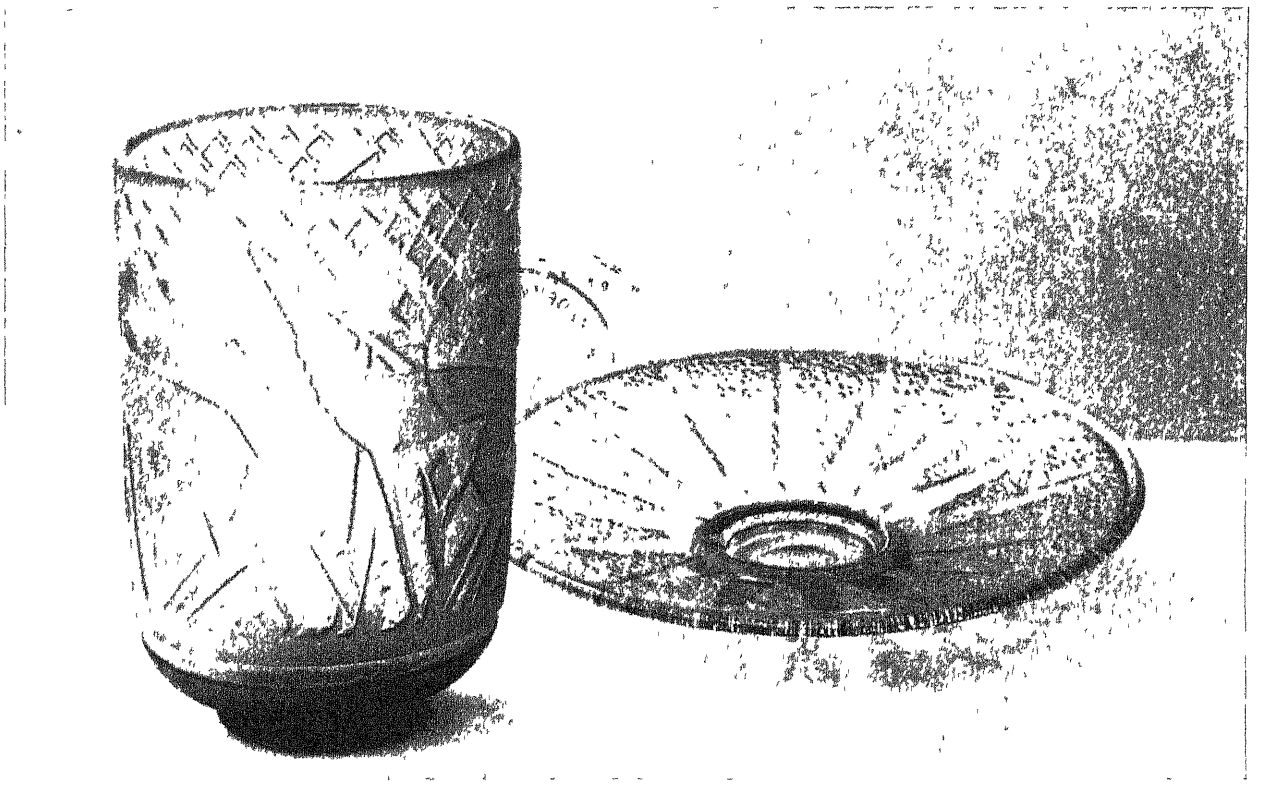
ENGRAVED CRYSTAL GOBLET AND TWO VASES IN COLOURED HELIOLITH

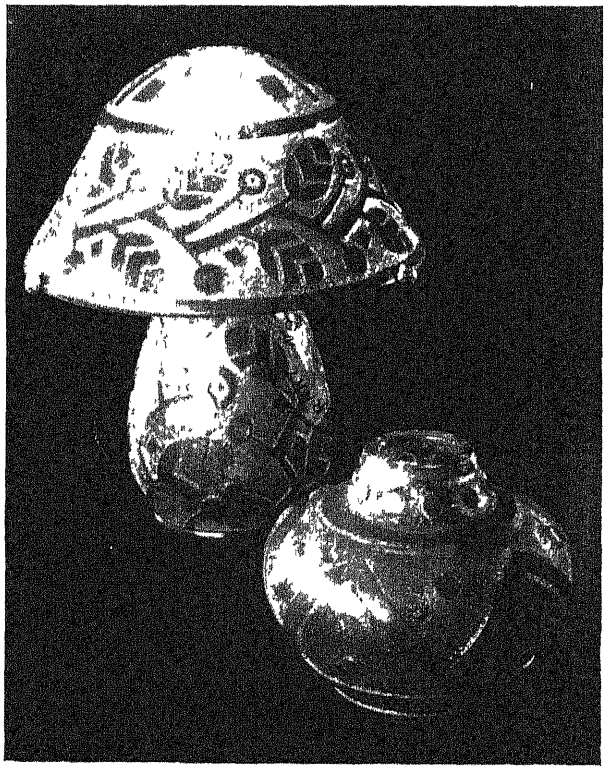


HOLMEGAARDS GLASVAERK, COPENHAGEN· COLOURED GLASS AND CRYSTAL TABLE WARE



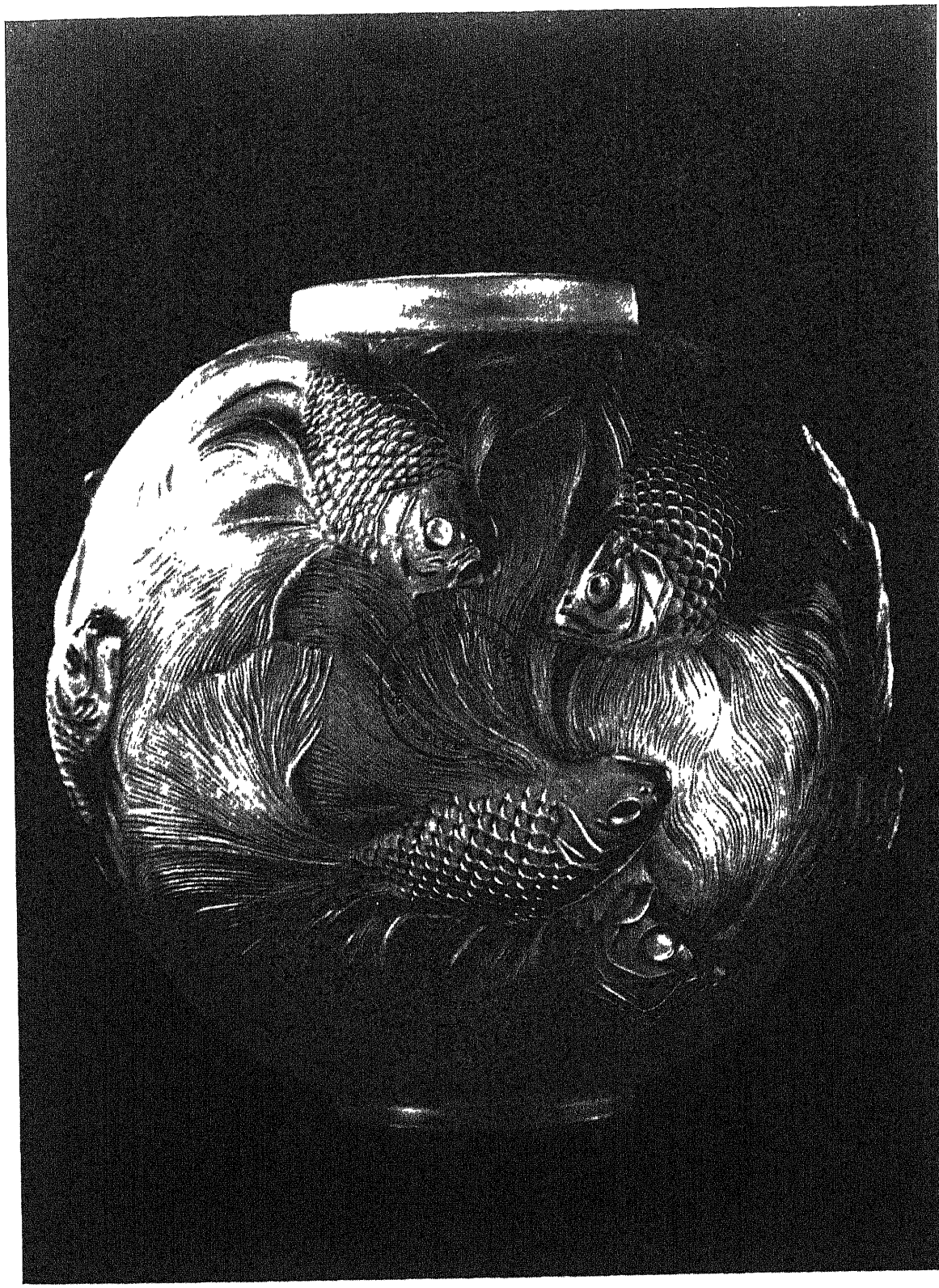
A DAUM, NANCY GLASSWARE DECORATED WITH ENAMEL, 1910–1915 (ABOVE): FLUSHED ENGRAVED GLASS, 1890–1905 (BELOW)



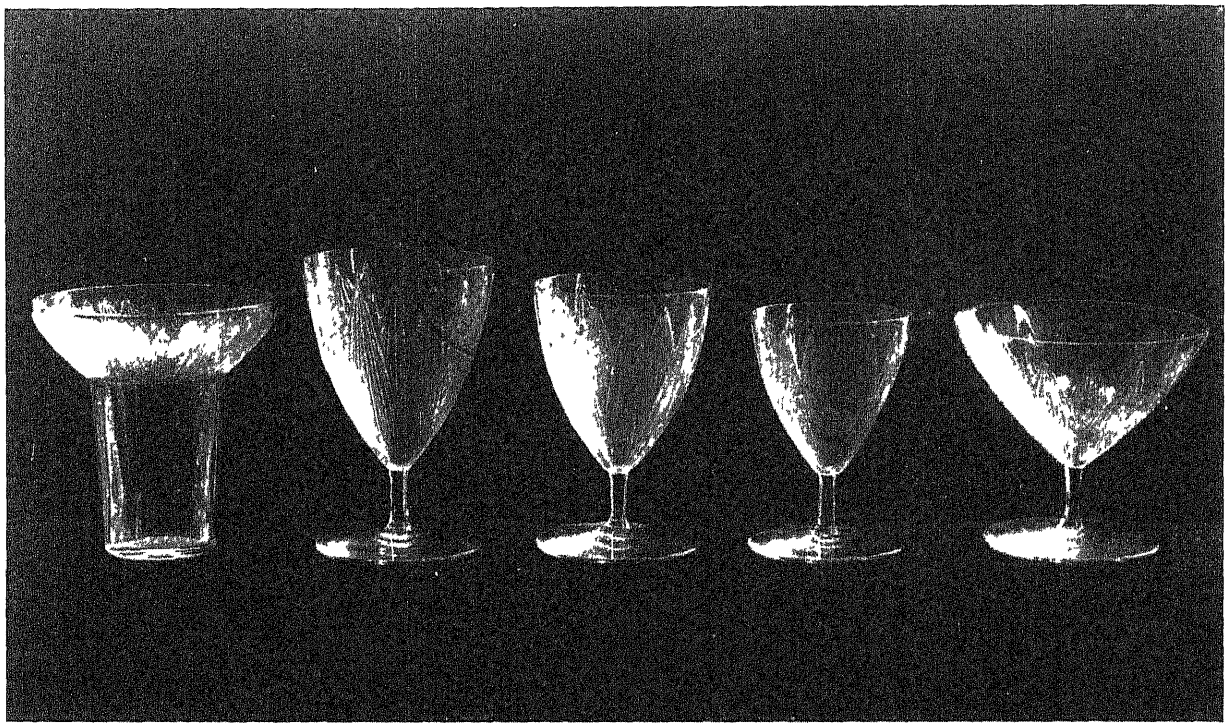


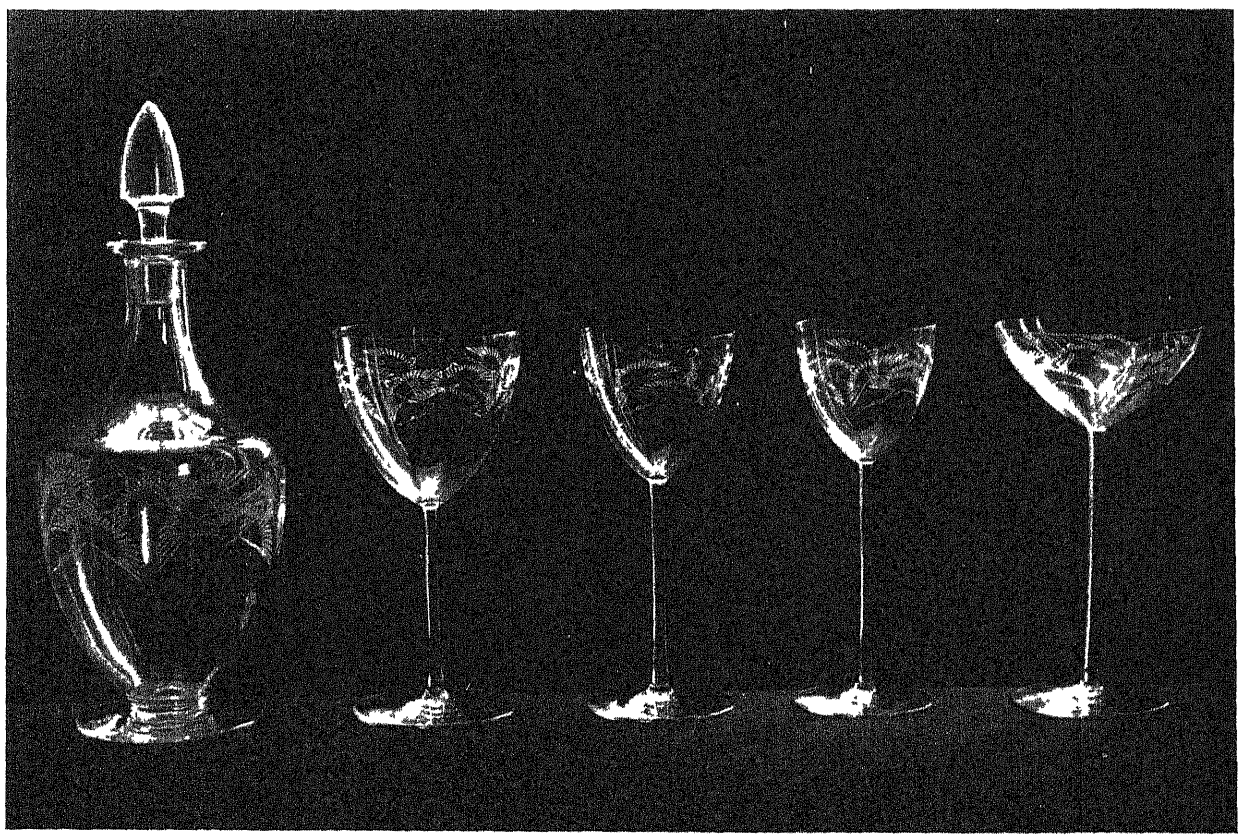
A DAUM, NANCY GLASSWARE ENGRAVED BY ACID

RENÉ LALIQUE, PARIS: GLASS VASES, FLUSHED, MOULDED AND ENGRAVED



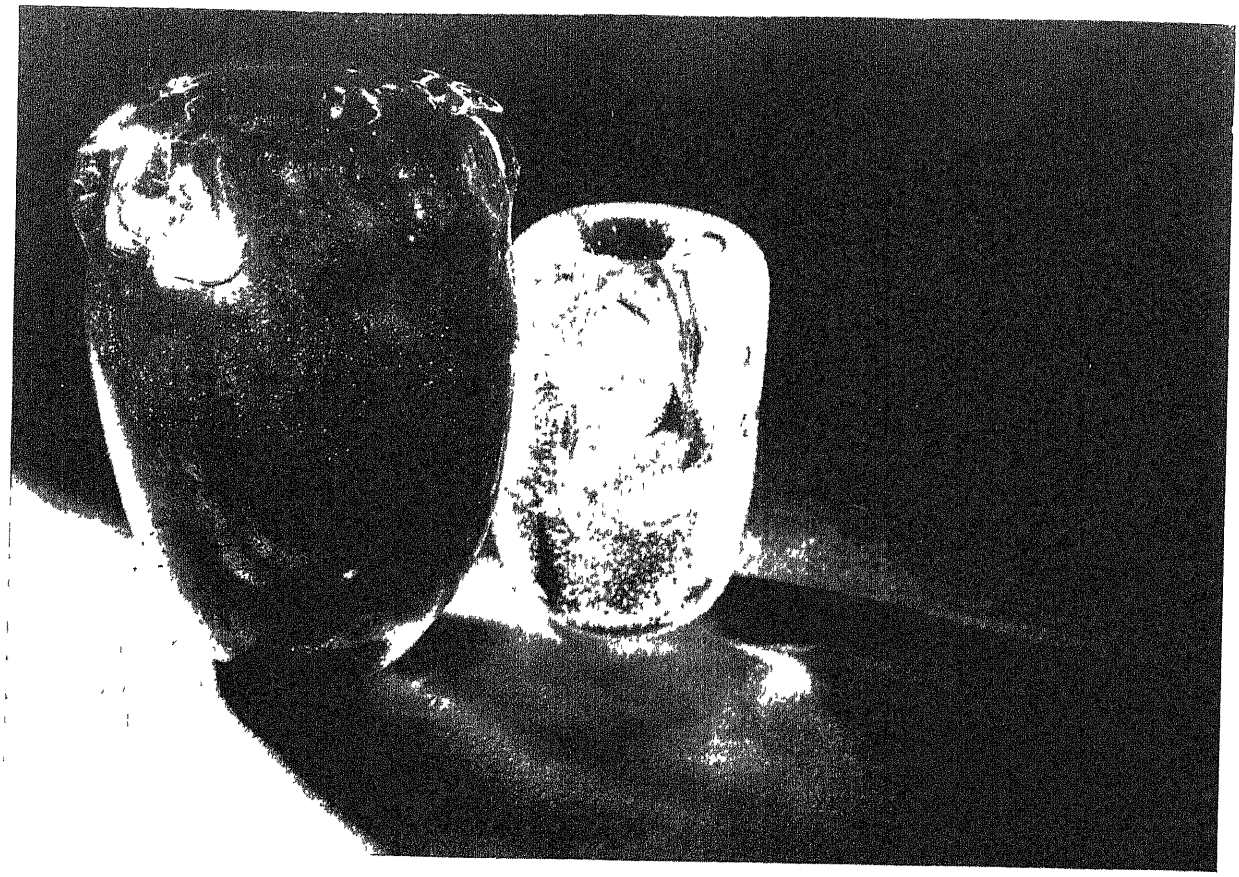
RENÉ LALIQUE VASE OF MOULDED GLASS, ENGRAVED WITH A FISH PATTERN

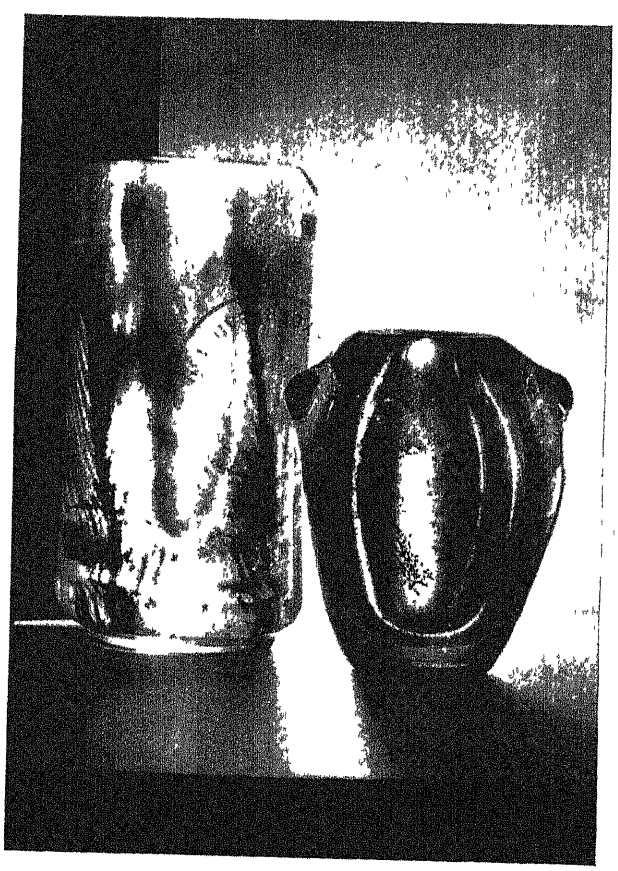


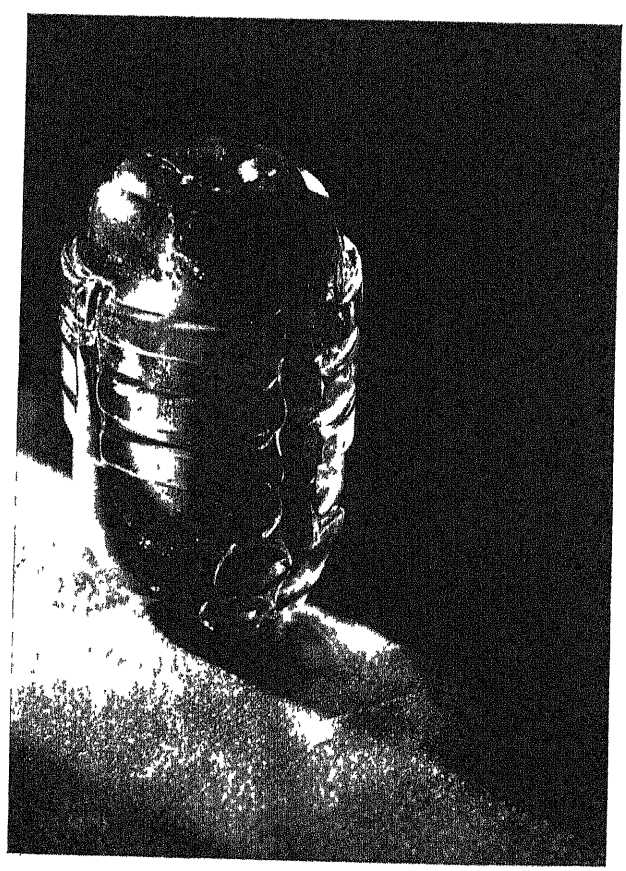


RENÉ LALIQUE· ENGRAVED TABLE CRYSTALS. (ABOVE) "LOTUS" PATTERN (BELOW) "STORK" PATTERN

JEAN SALA BLOWN GLASS, WORKED WHILE HOT ON LEFT VASE IN PALE GREEN GLASS WITH JADE DECORATION CENTRE WHITE GLASS VASE, WITH DECORATION OF GREEN LEAVES ON RIGHT FISH IN MAUVE, GREEN AND BLUE GLASS

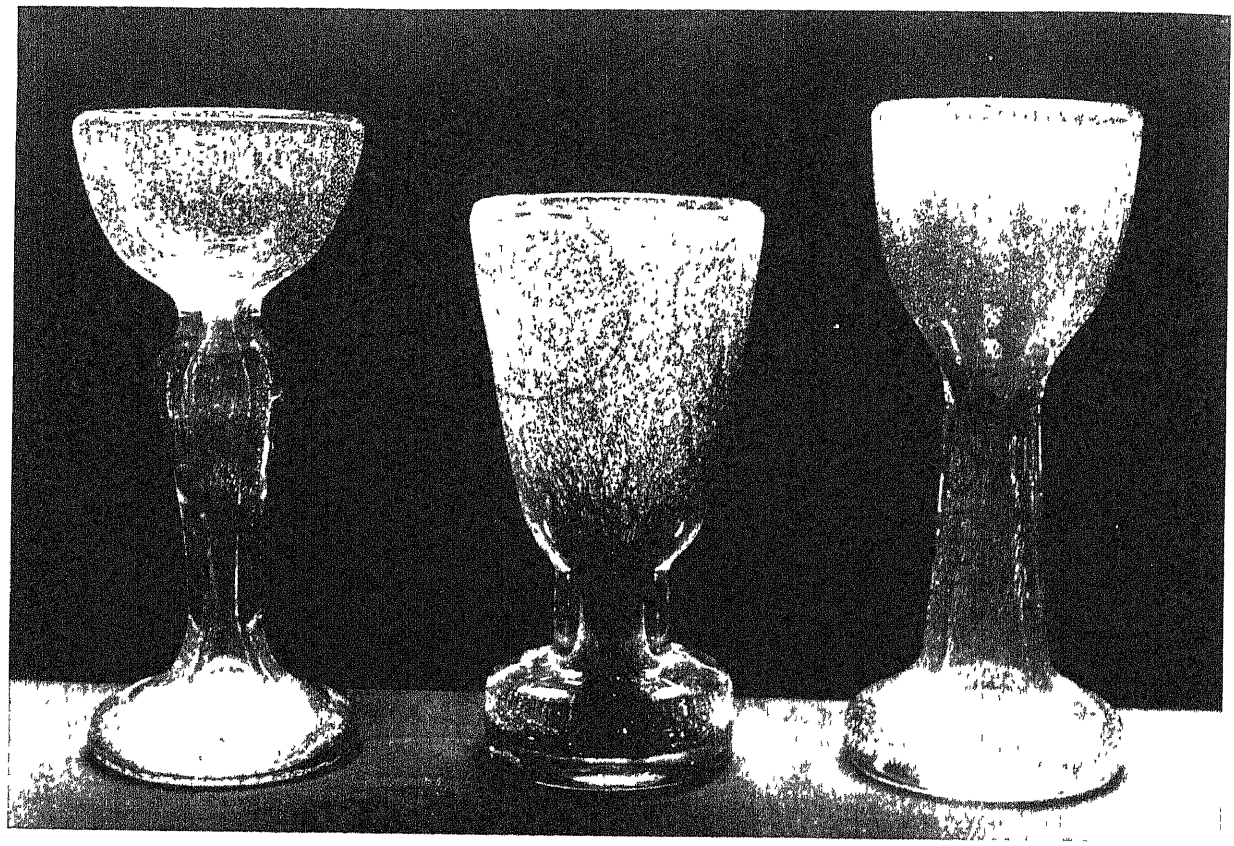


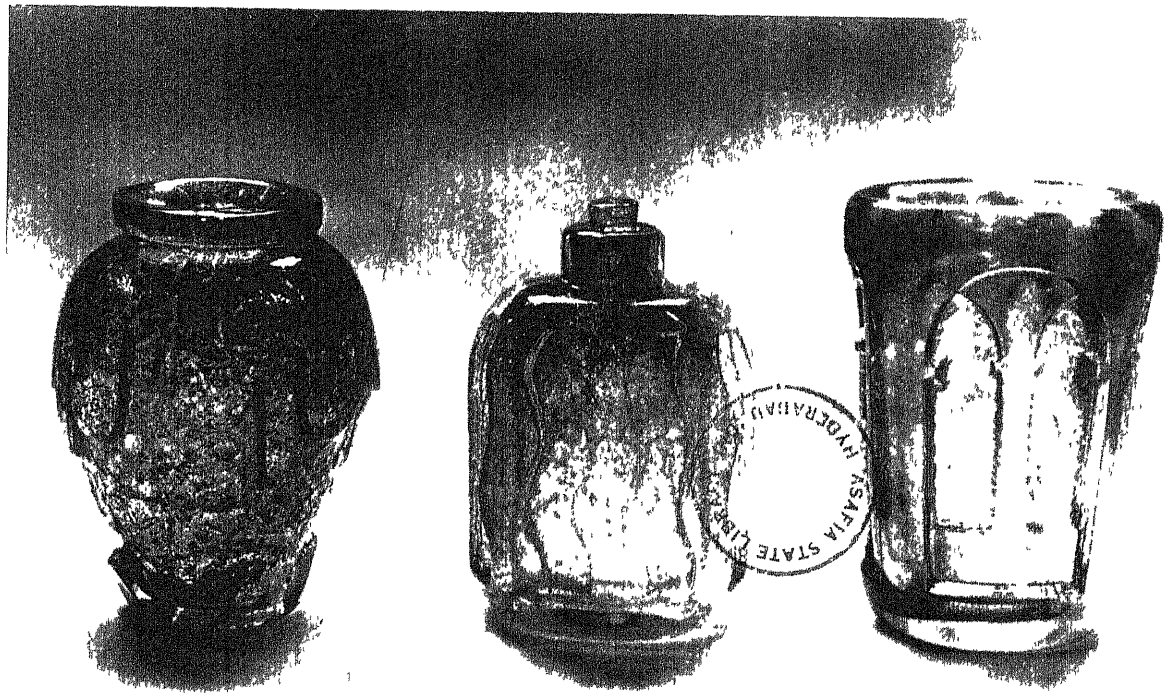




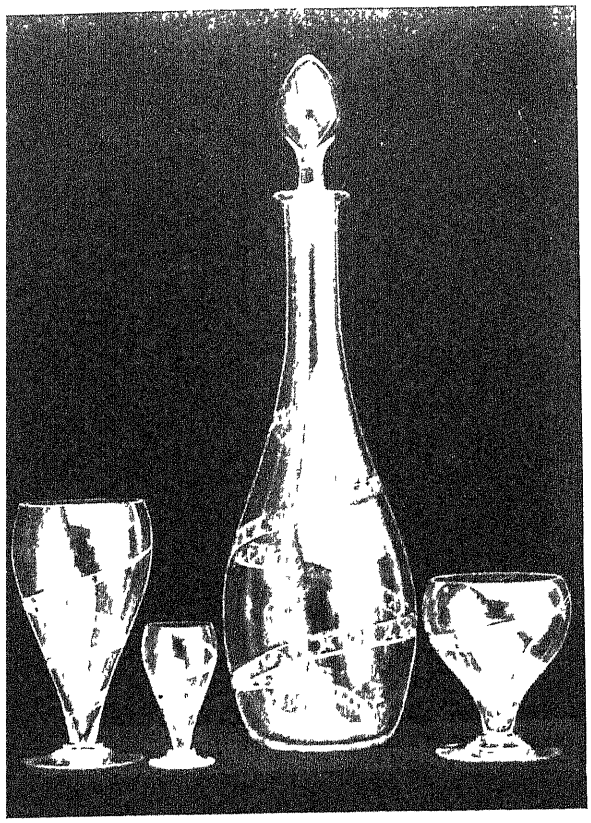
HENRI NAVARRE (PRODUCED BY GEO. ROUARD). GLASS VASES COLOURED RIGHT THROUGH AND DECORATED WITH THE TOOL

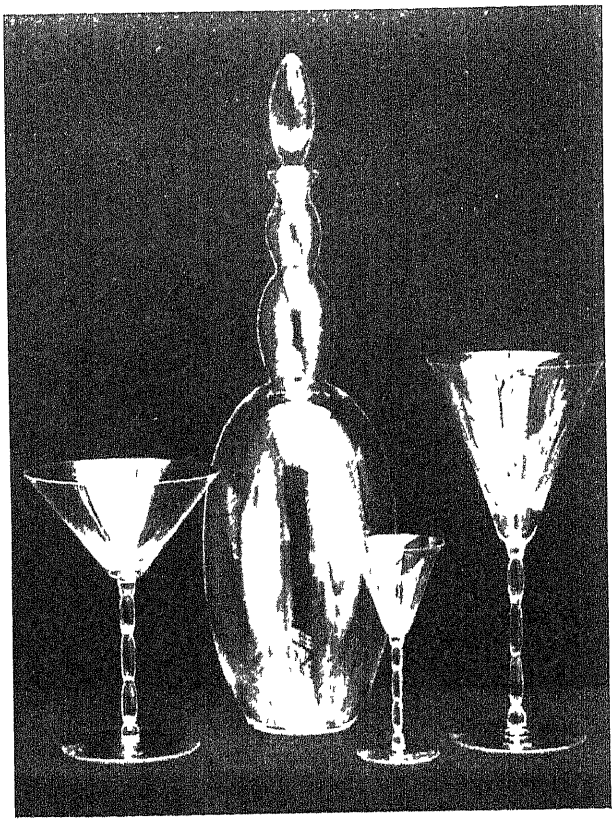
MAURICE MARINOT VASE IN GLASS DEEPLY ENGRAVED WITH ACID

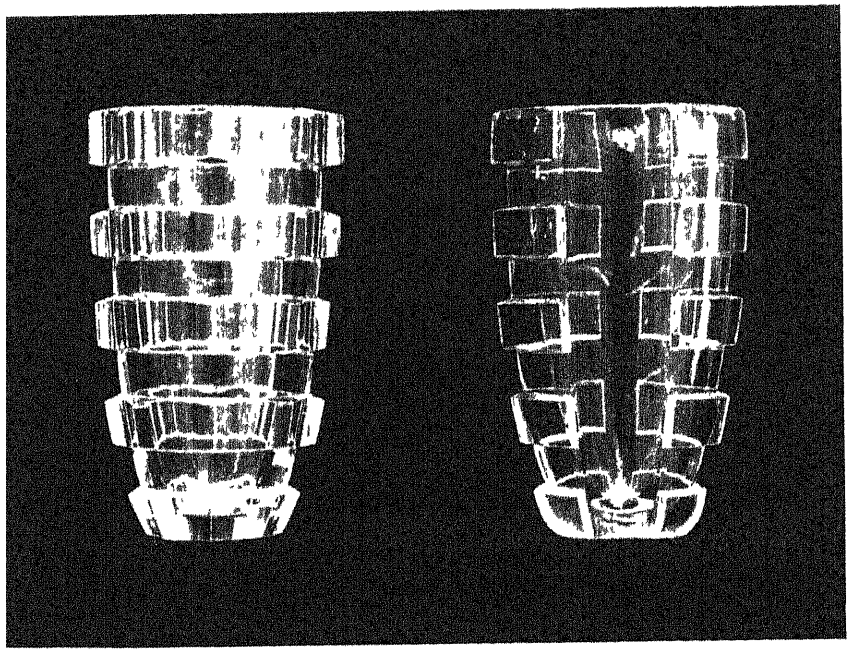


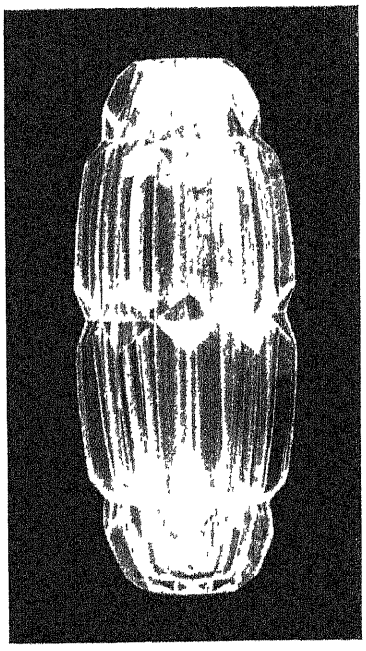



MAURICE MARINOT VASES IN "BUBBLE" GLASS



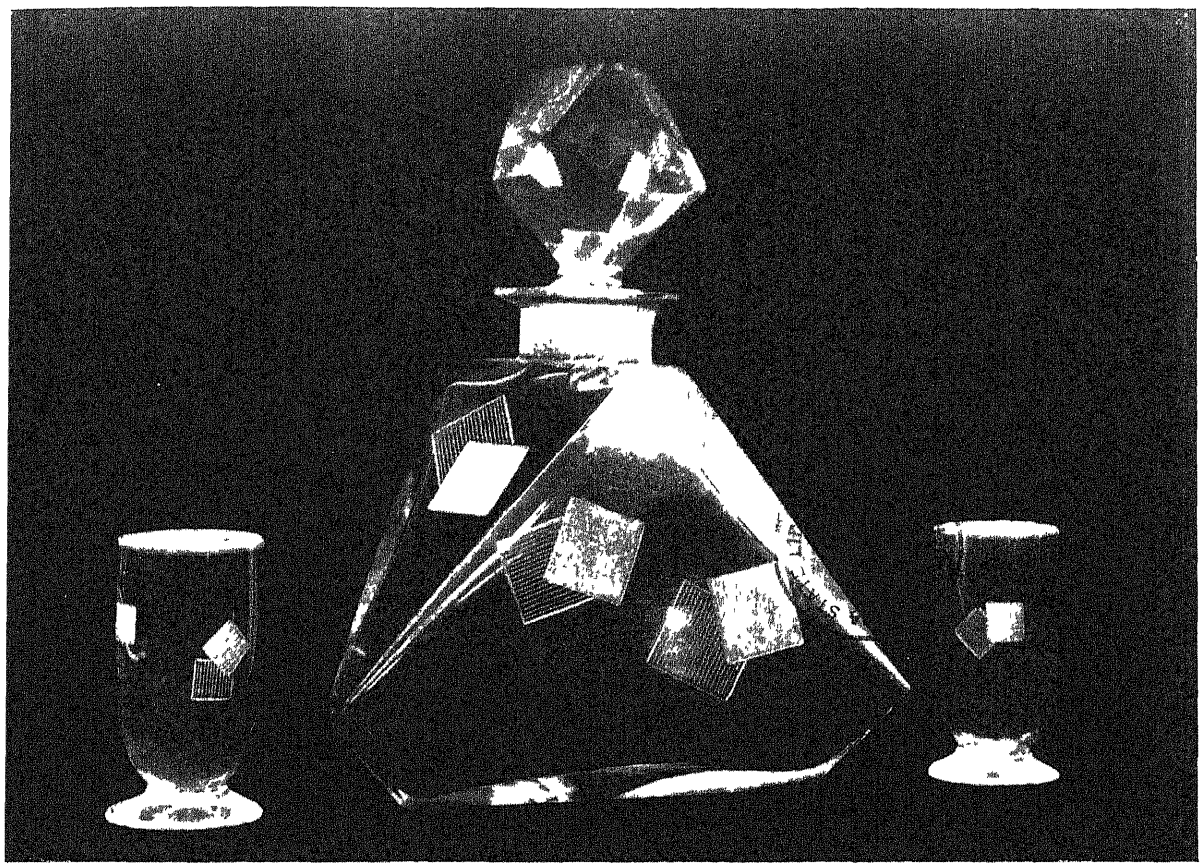






BACCARAT CRYSTAL WORKS' CUT CRYSTAL

LOUIS SUE AND ANDRÉ MARL: CUT CRYSTAL TABLE GLASS



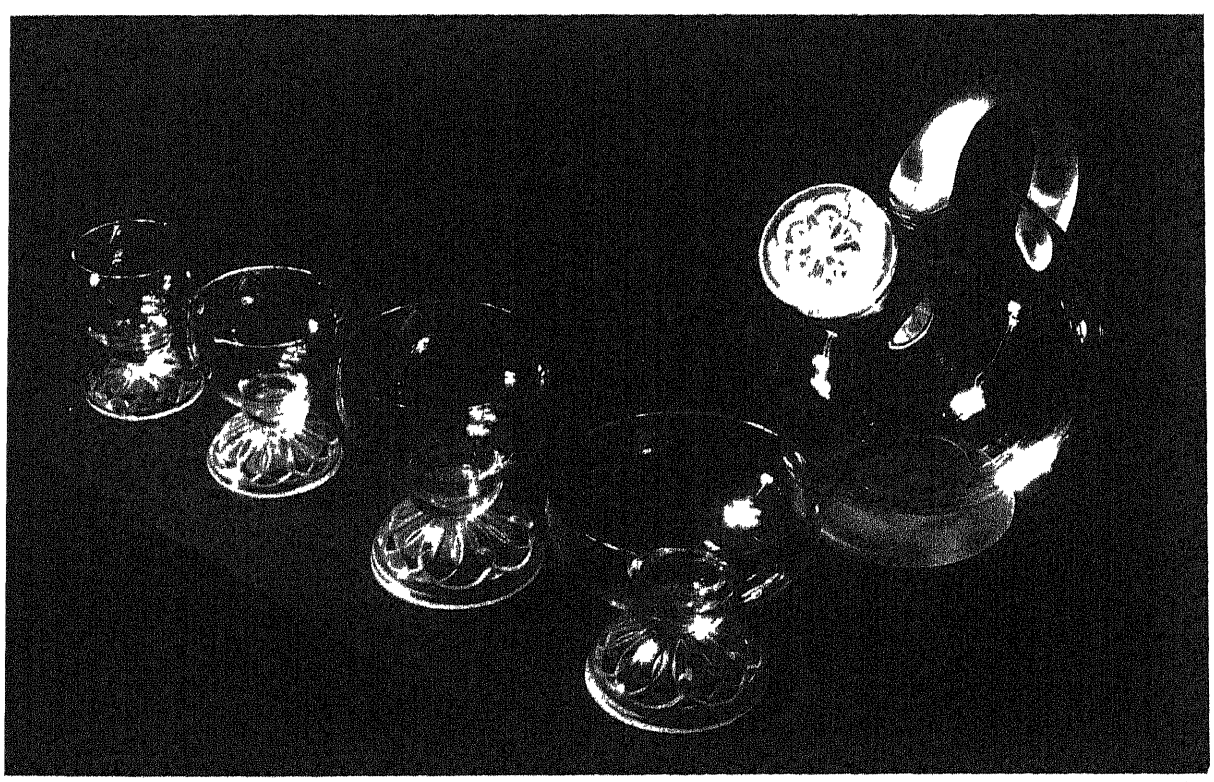


*Photo Jean Collas*

SINAC PORT DECANTER AND GLASSES (ABOVE). ANDRÉ HUNEBELLE: DECANTER AND GLASSES, "ROSE" PATTERN (BELOW)

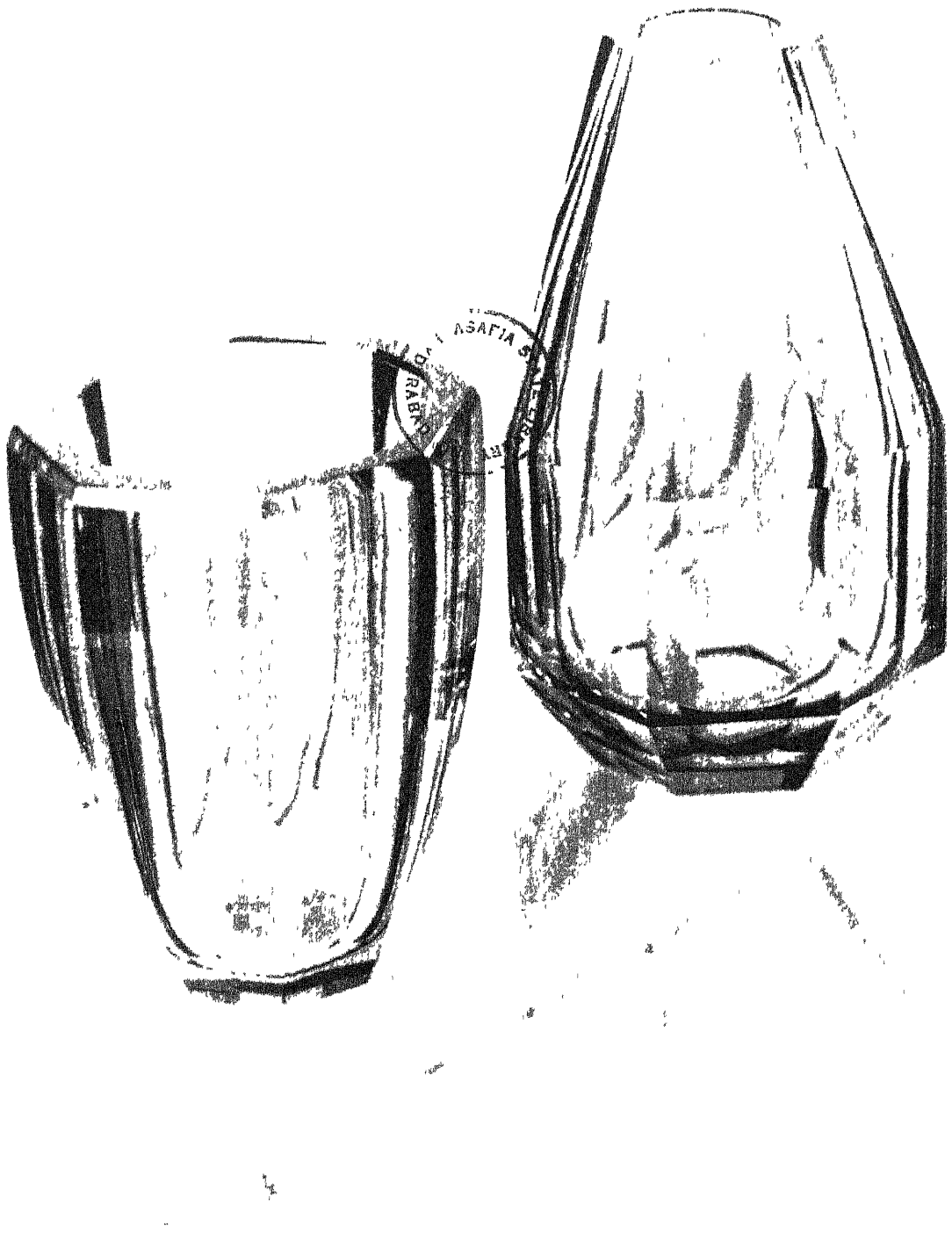


*Photo Schall*

MARCEL GOUPY (PRODUCED BY GLO ROUARD) VASES IN HEAVY EMERALD GLASS

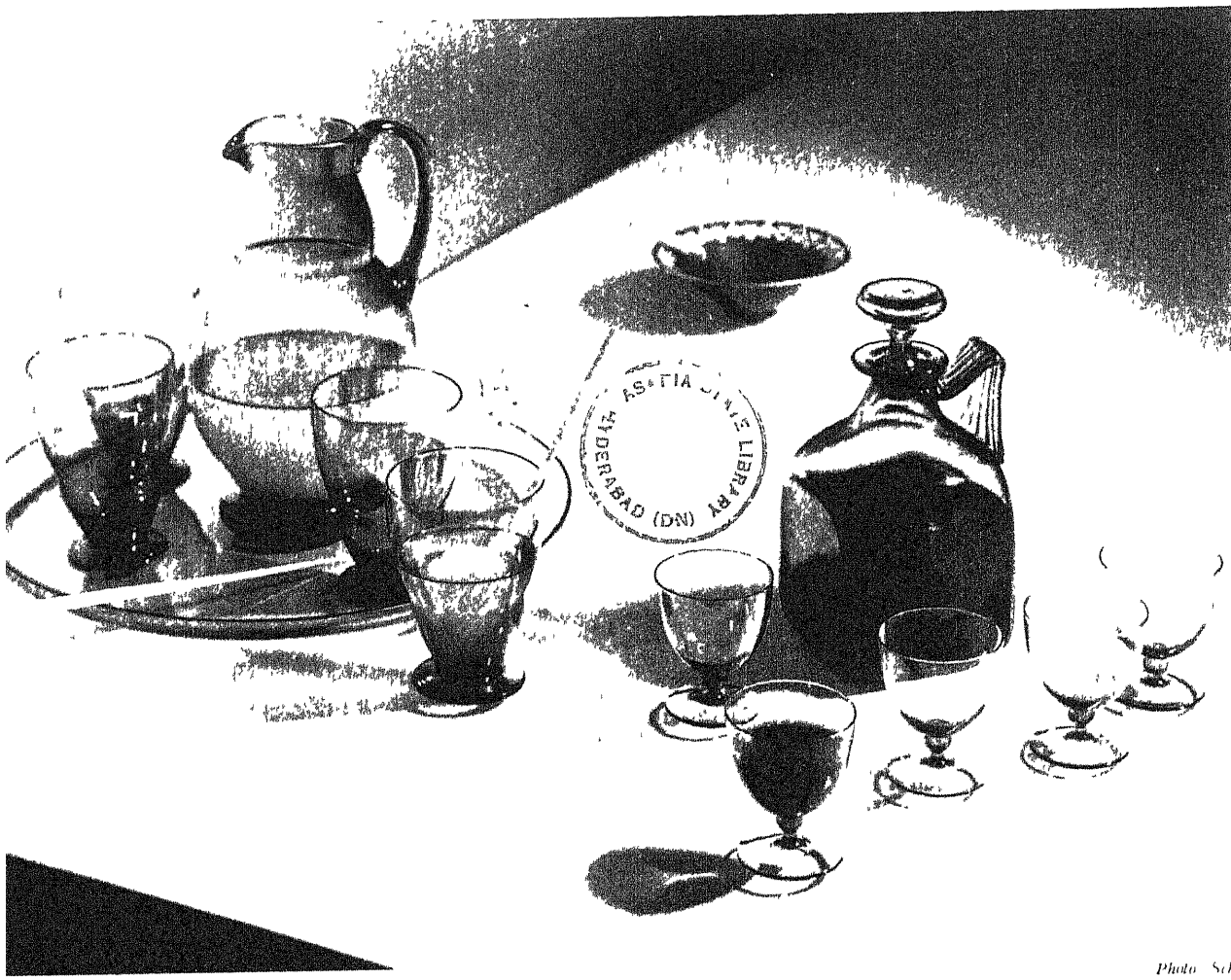
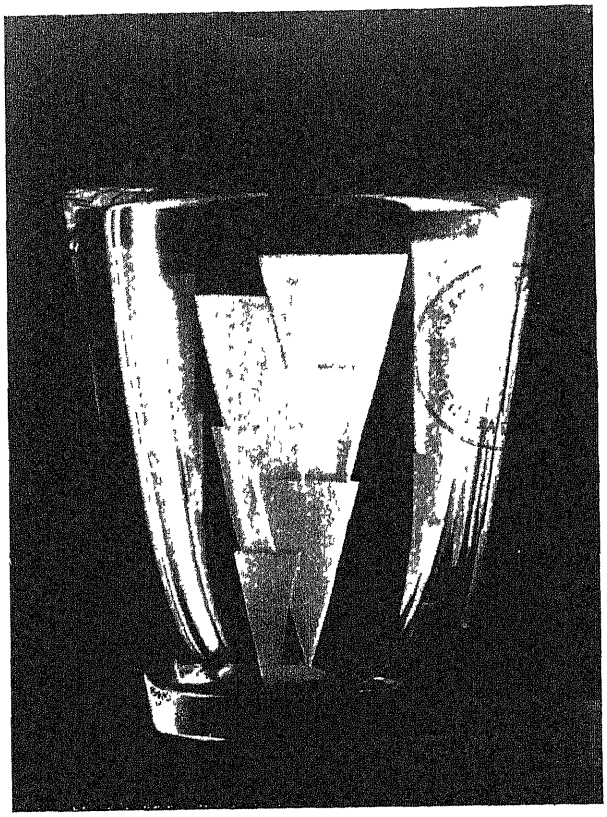
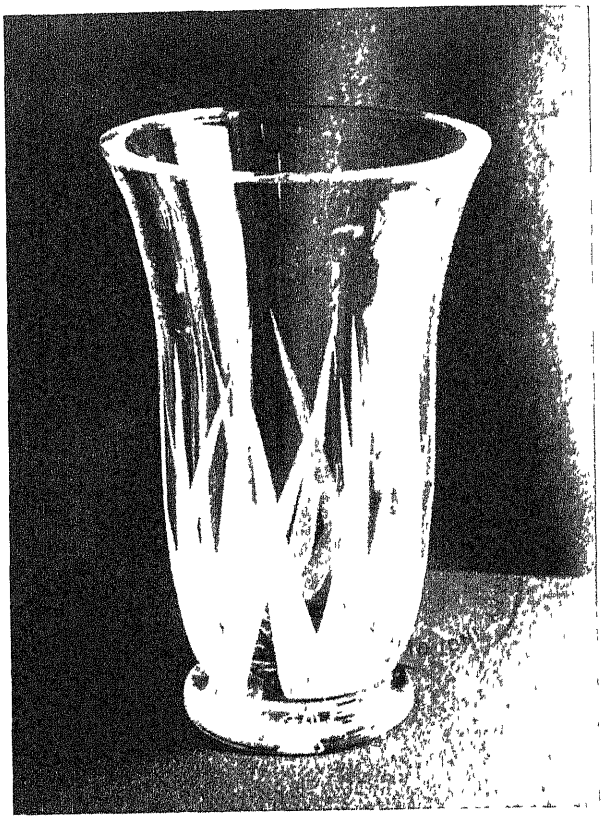



*Photo Schall*

MARCEL GOUPY (PRODUCED BY GIO ROUARD) TABLE WARE IN SMOKED GLASS

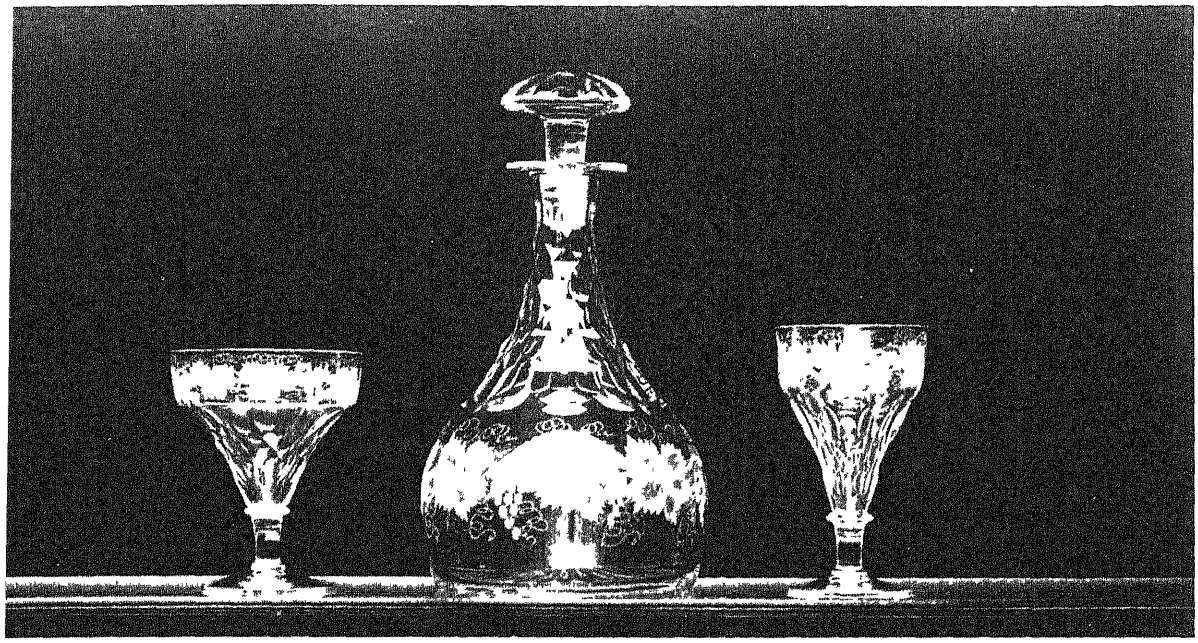


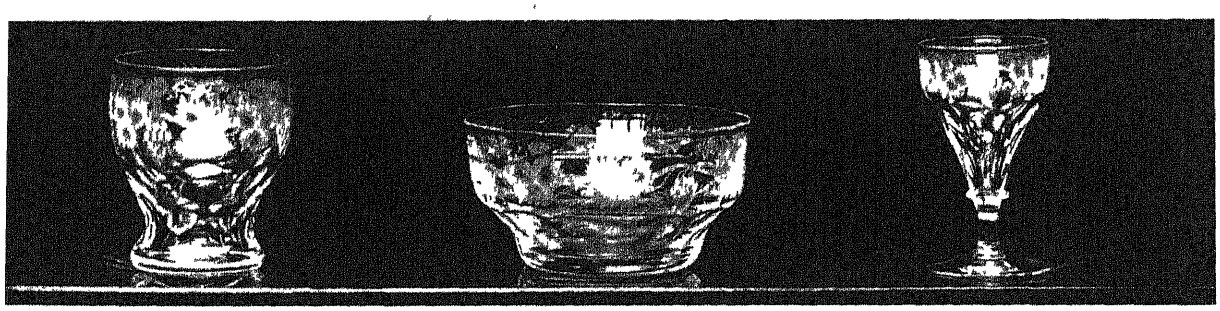


JEAN LUCE. VASES IN ENGRAVED AND CUT GLASS

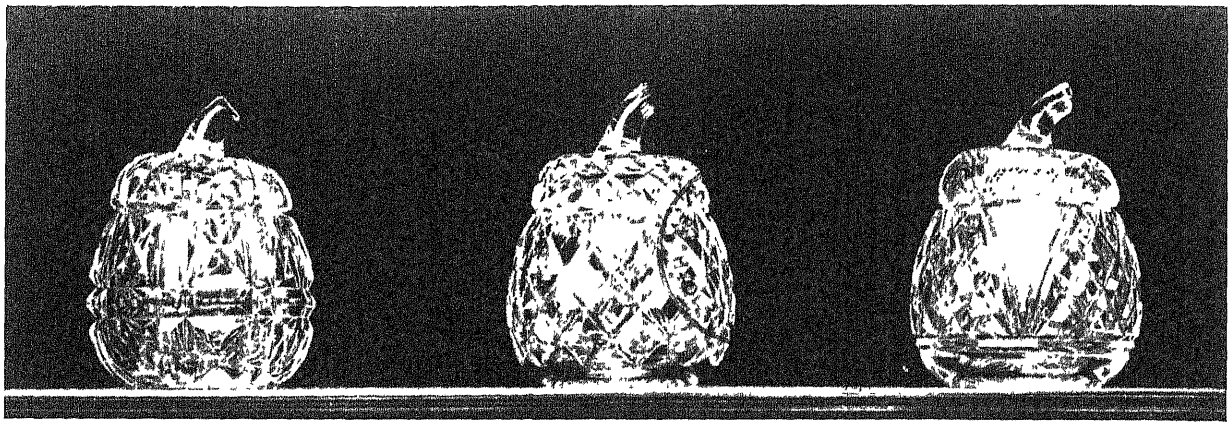
ZWIESEL TECHNICAL SCHOOL, BAVARIA VASES WITH DECORATIONS OF COLOURED ENAMEL

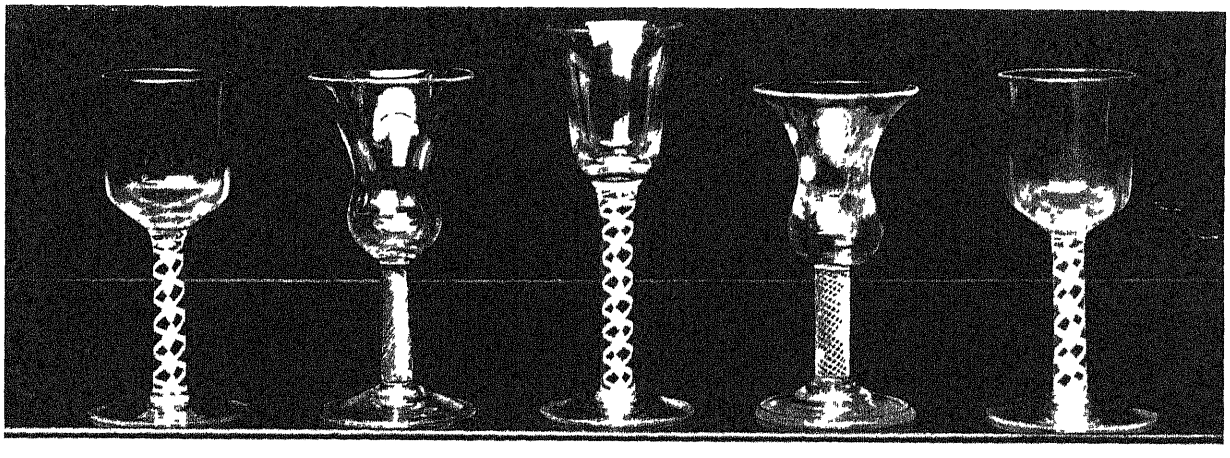
ZWIESEL TECHNICAL SCHOOL, BAVARIA VASE AND BOWL IN ENGRAVED GLASS

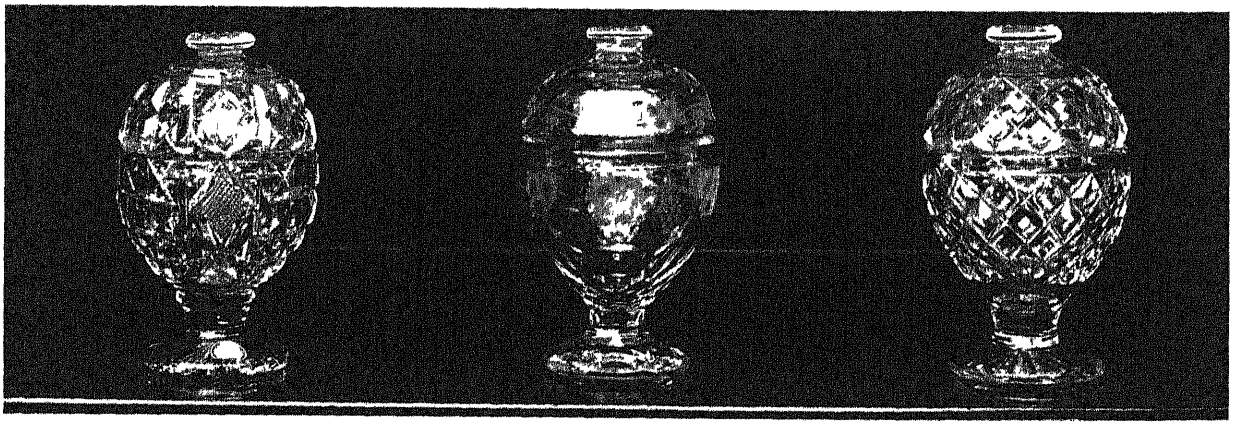




JOHN WALSH WALSH, LTD, BIRMINGHAM ENGRAVED AND CUT CRYSTAL TABLE WARE







JOHN WALSH WALSH, LTD., BIRMINGHAM. ENGRAVED AND CUT CRYSTAL TABLE WARE

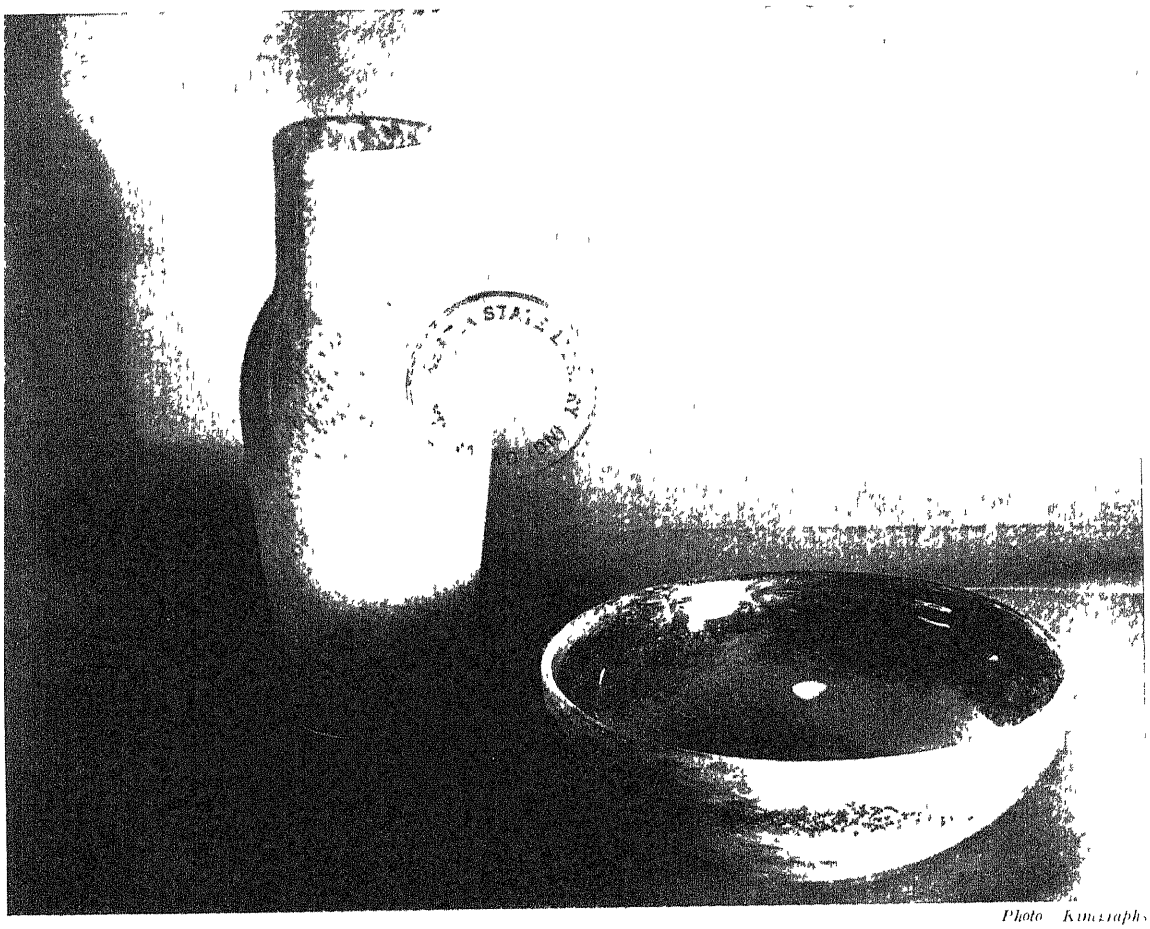
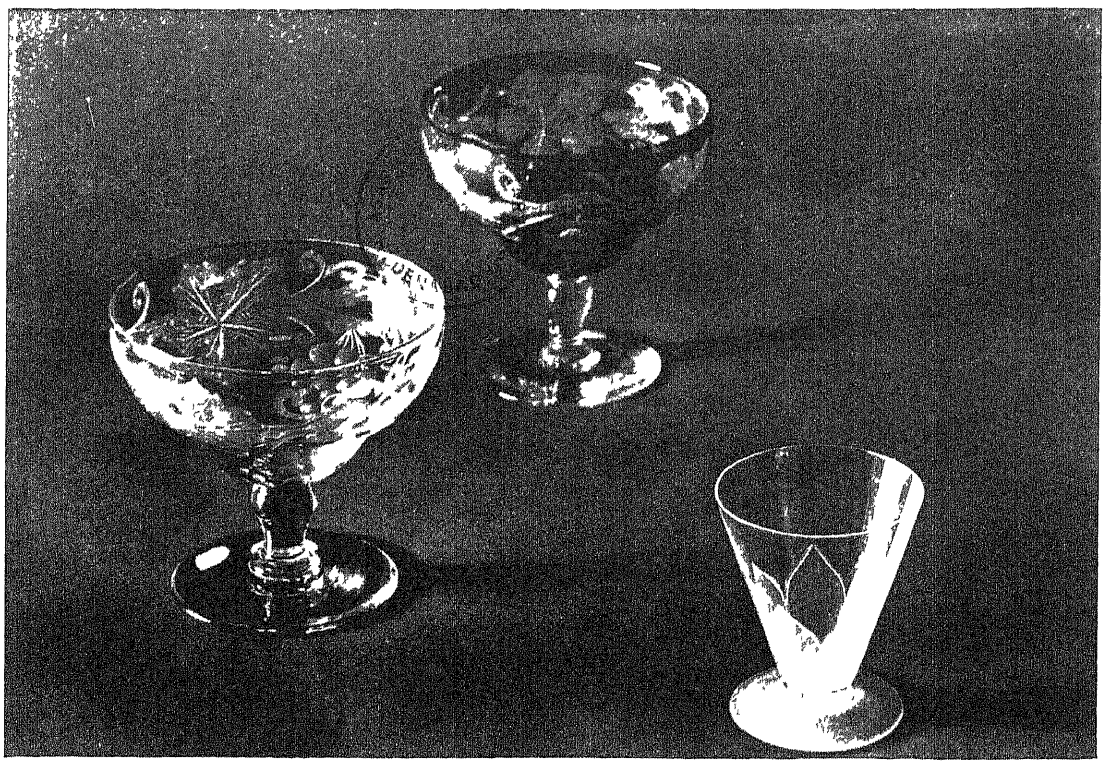
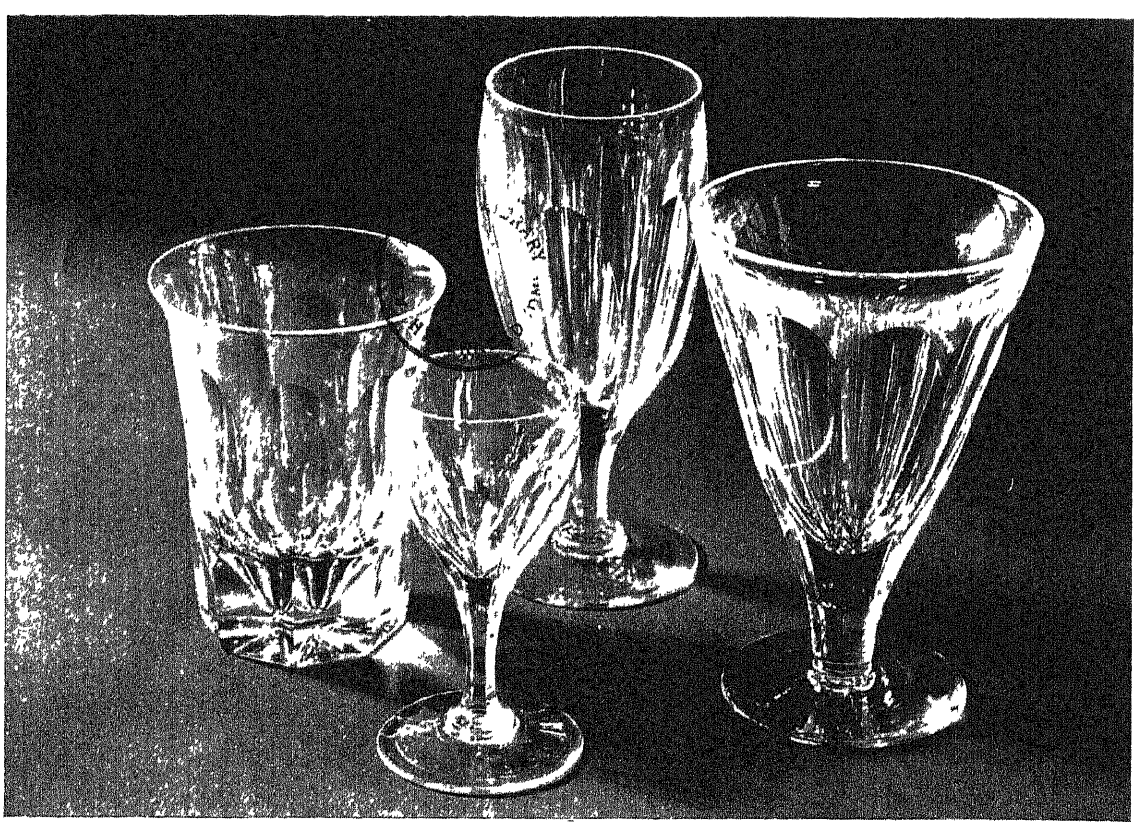


*Photo Kinnaphs*

JOHN MONCRIEFF, LIMITED, PERTH VASE AND BOWL IN ETCHED "MONART" GLASS



STEVENS & WILLIAMS, STOURBRIDGE ENGRAVED WINE GLASSES AND COCKTAIL GLASS



*Photos Kinegraphs*

THOMAS WEBB & SONS (WEBB'S CRYSTAL GLASS CO., LTD), LONDON
CUT CRYSTAL WINE GLASSES AND TUMBLER

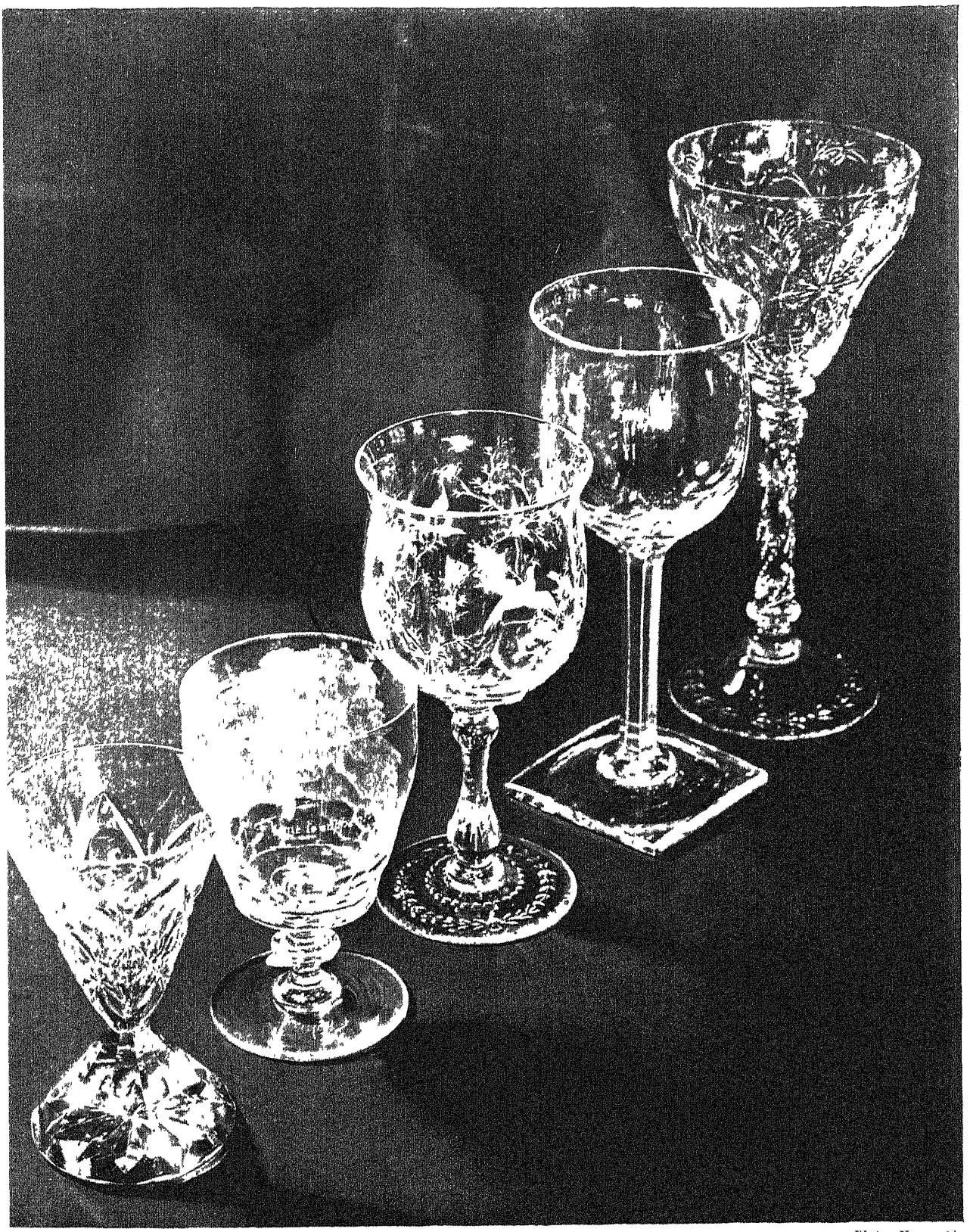


*Photo Kinegraphs*

THOMAS WEBB & SONS (WEBB'S CRYSTAL GLASS CO., LTD), LONDON.
ENGRAVED AND CUT TABLE CRYSTAL

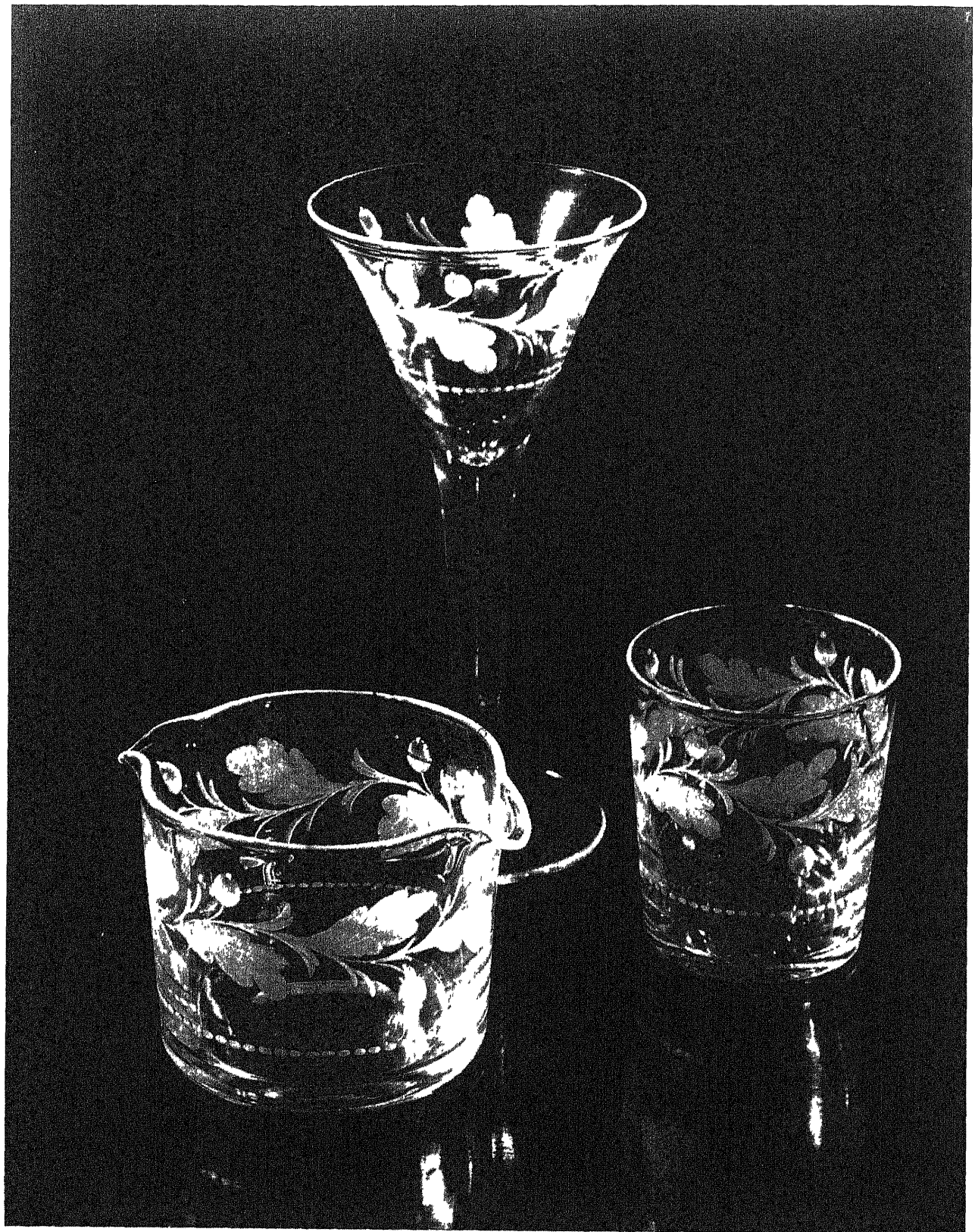


*Photo Kingsgraphs*

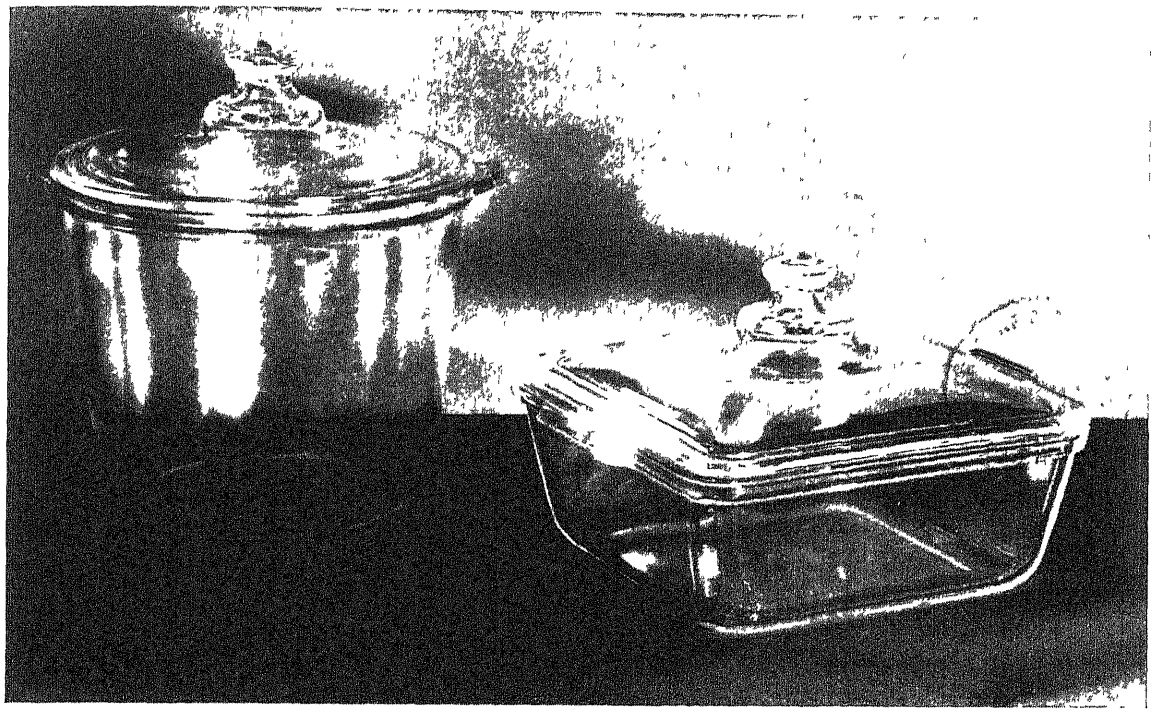
THOMAS WEBB & SONS (WEBB'S CRYSTAL GLASS CO., LTD.), LONDON.
WINE COOLER, GOBLET AND TUMBLER WITH ENGRAVED OAK LEAF PATTERN

*Photo Kinegraphs*

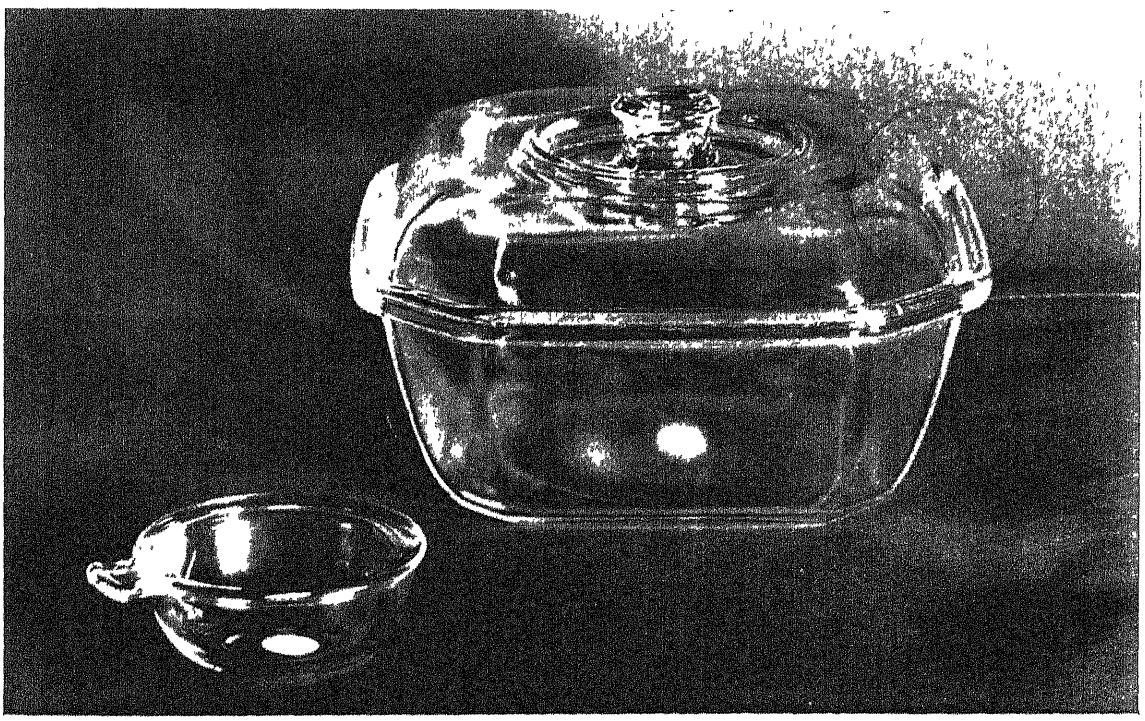
ES POWELL & SONS (WHITEFRIARS), LTD., LONDON. BARREL-SHAPED VASE AND LLOW BOWL IN HEAVY GLASS. TAPERING VASE WITH A WAVED RIB, MADE IN SHADES OF BLUE, GREEN AND GOLD, AND LILAC

*Photo Kinegraphs*

JAMES POWELL & SONS (WHITEFRIARS), LTD., LONDON. COCKTAIL SET IN SEA-GREEN BLOWN GLASS WITH DECORATION OF BLUE THREADS

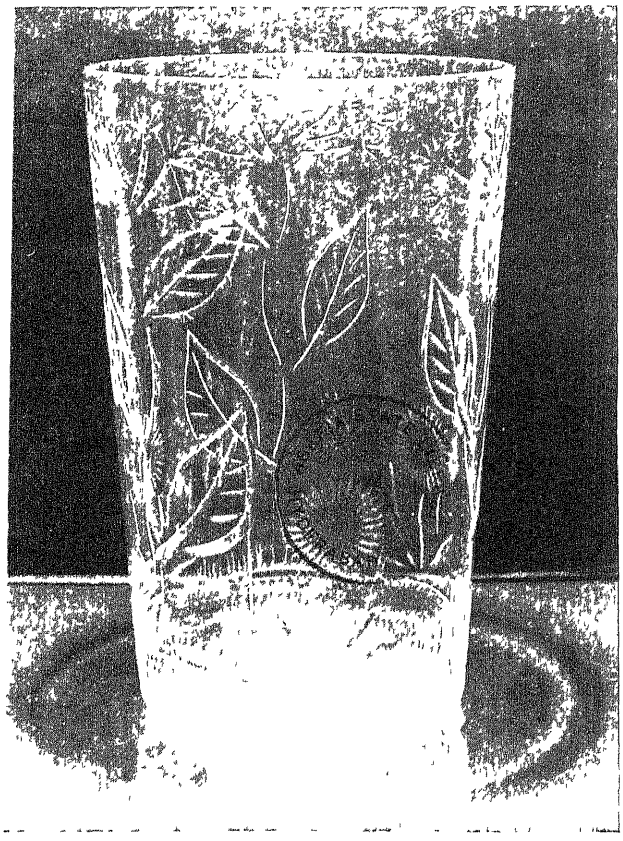


JAMES A. JOBLING & CO., LIMITED, SUNDERLAND. FIREPROOF CASSEROLE AND ENTRÉE DISH IN "PYREX" GLASS



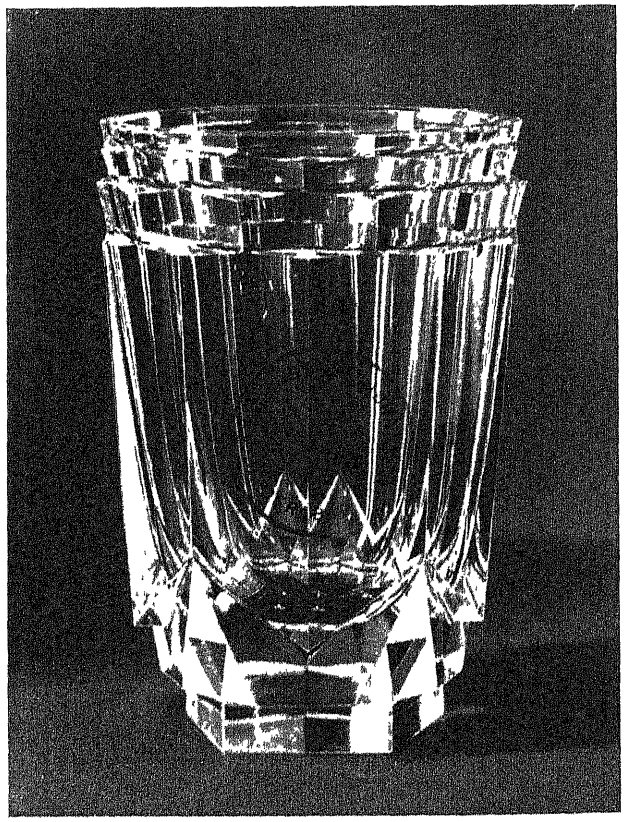
*Photos Kinegraphs*

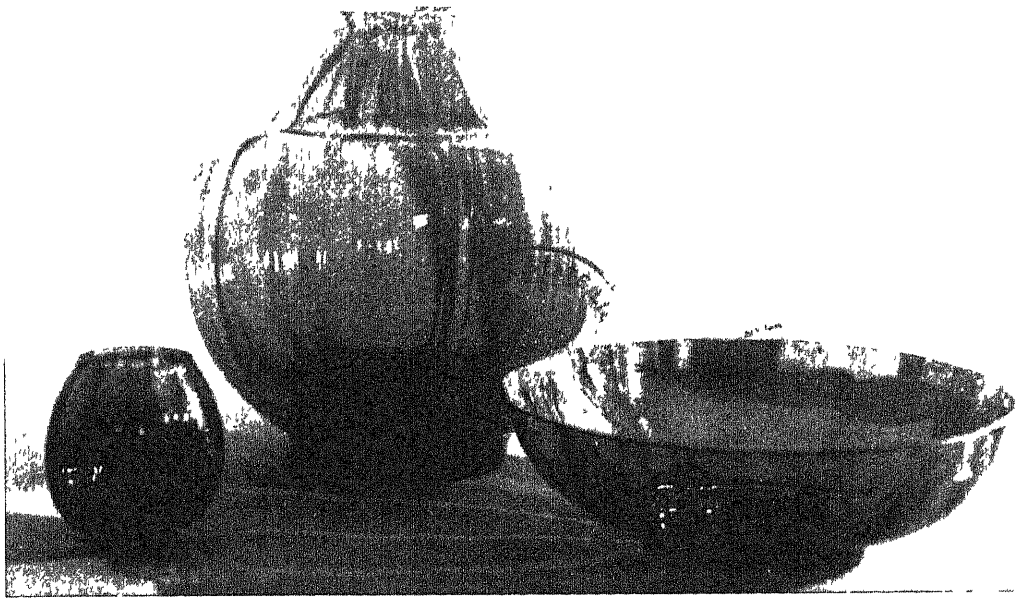
CHANCE BROTHERS & CO., LIMITED, SMETHWICK. FIREPROOF GLASS ENTRÉE DISH AND RAMEQUIN IN "ORLAK" OVEN WARE



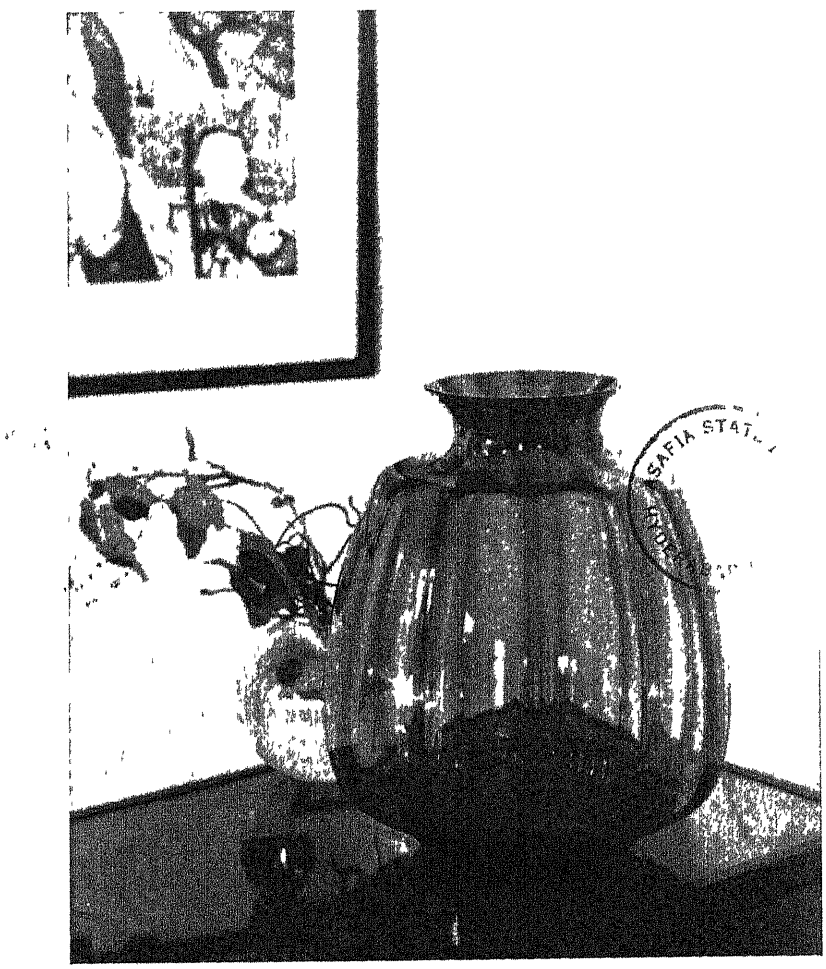
AMES POWELL & SONS (WHITEFRIARS), ID., LONDON. CRYSTAL TUMBLER ITH VERY SHALLOW CUTTING, DE-IGNED BY GORDON RUSSELL

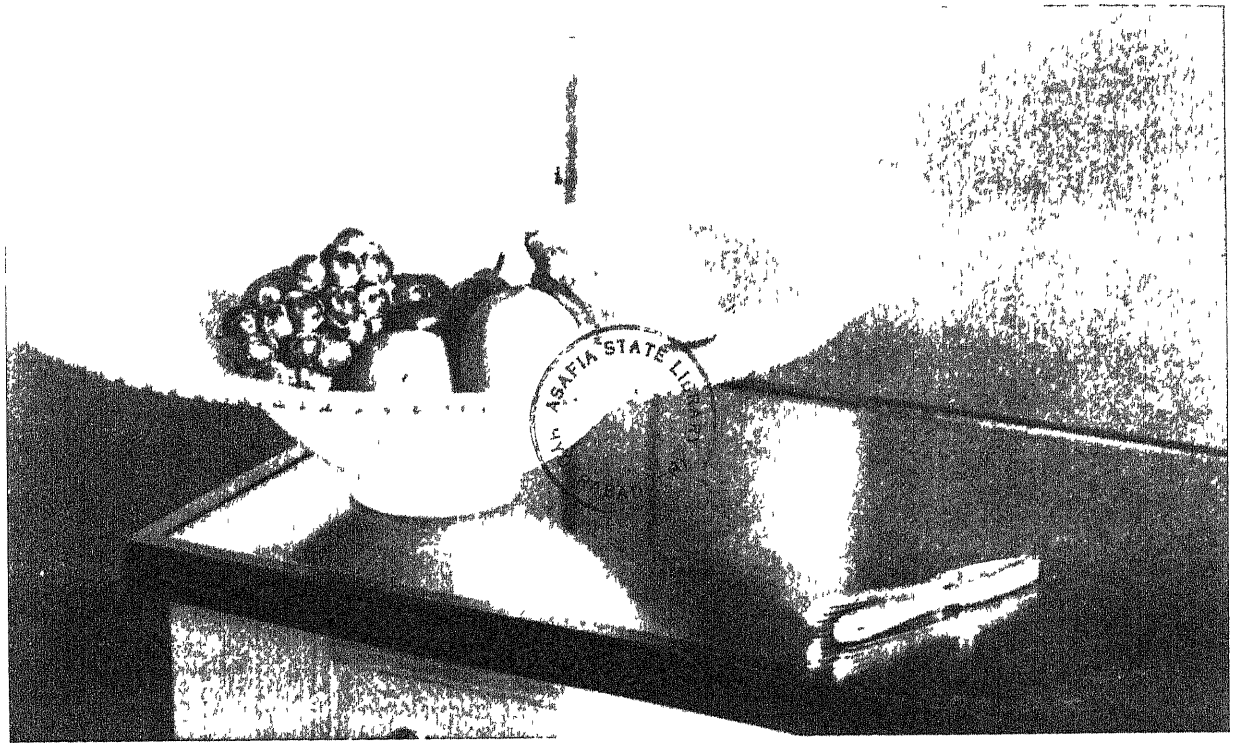
N. V. GLASFABRIEK "LEERDAM" "JUBILEE" VASE OF CUT CRYSTAL, DESIGNED BY A. D. COPIER



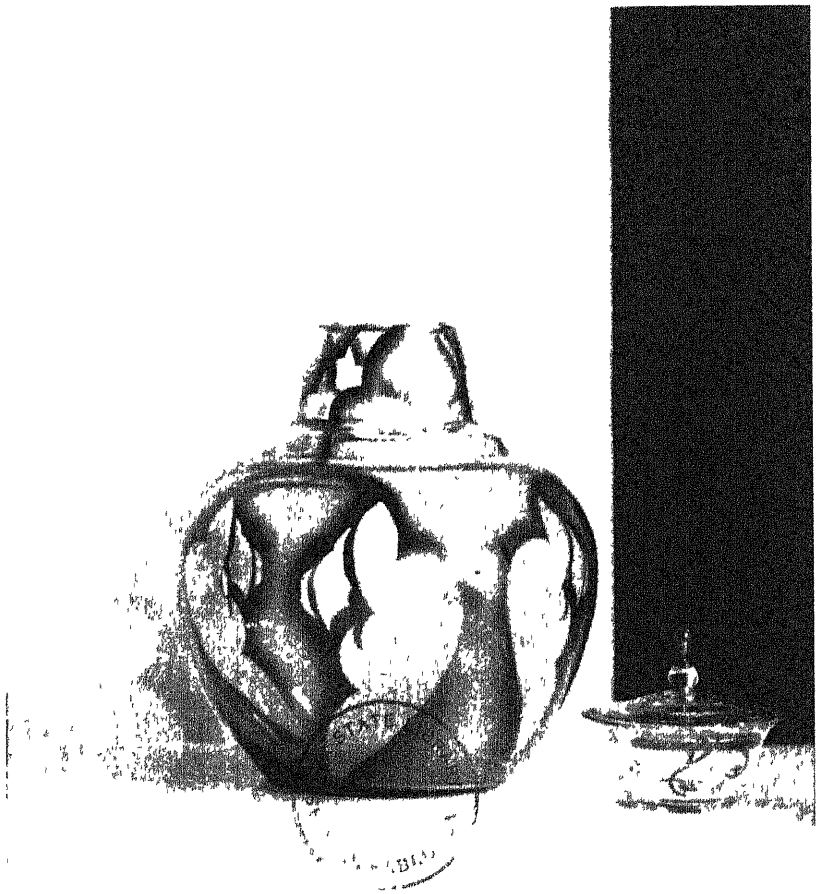


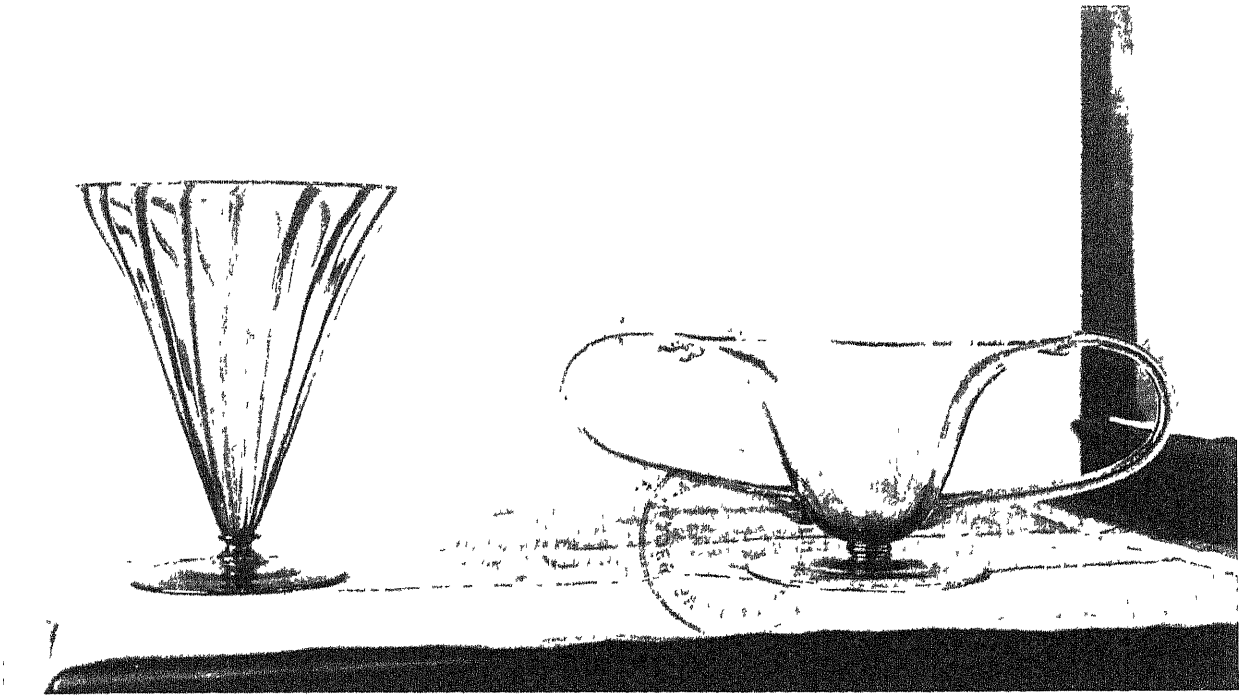
N V GLASFABRIEK "LEERDAM" BLOWN GLASS FLOWER VASES, DESIGNED BY A D COPIER





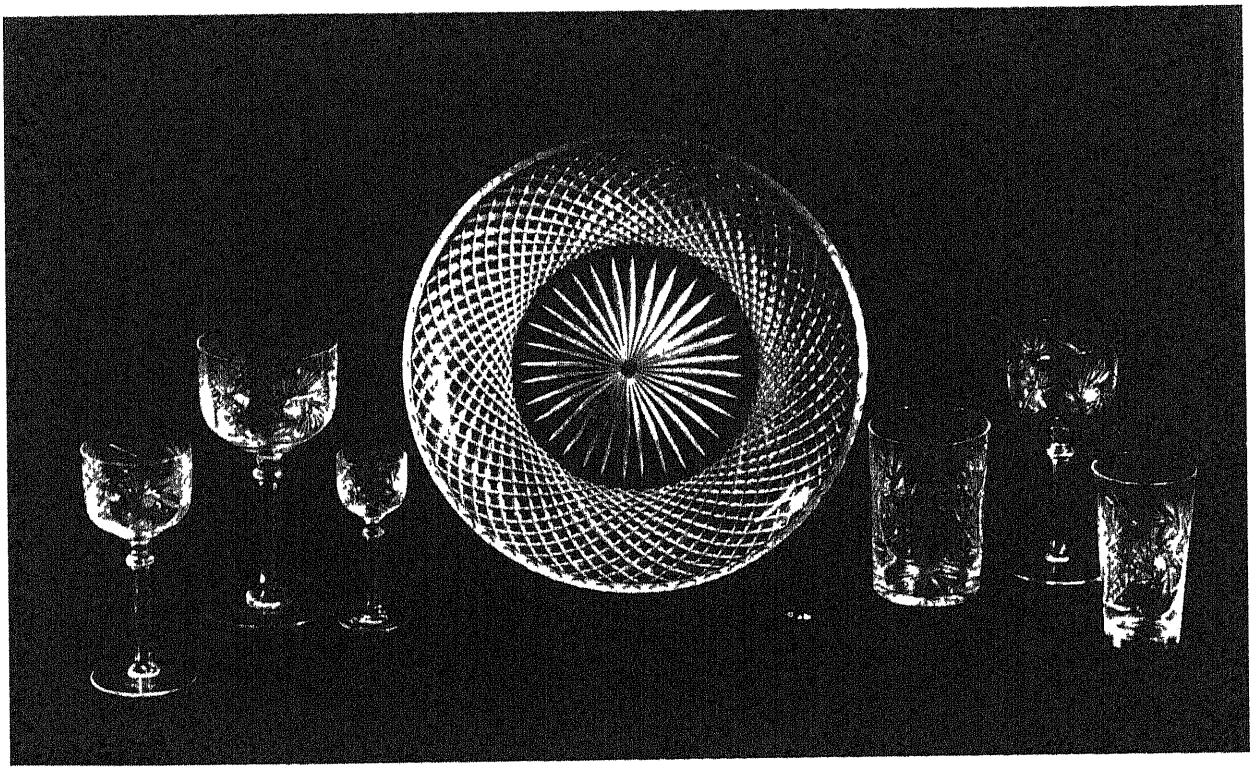
N V GLASFABRIEK "LEERDAM" GLASS FRUIT DISH, DESIGNED BY A D COPIER (ABOVE), AND PAINTED FLOWER VASE (BELOW), DESIGNED BY JAAP GIDDENS

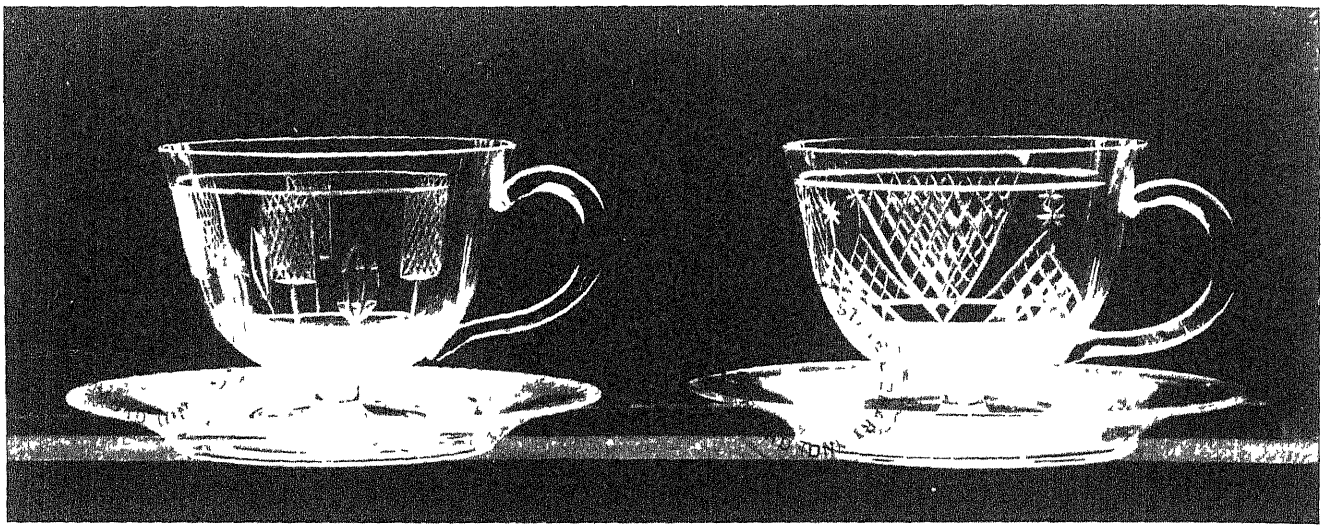




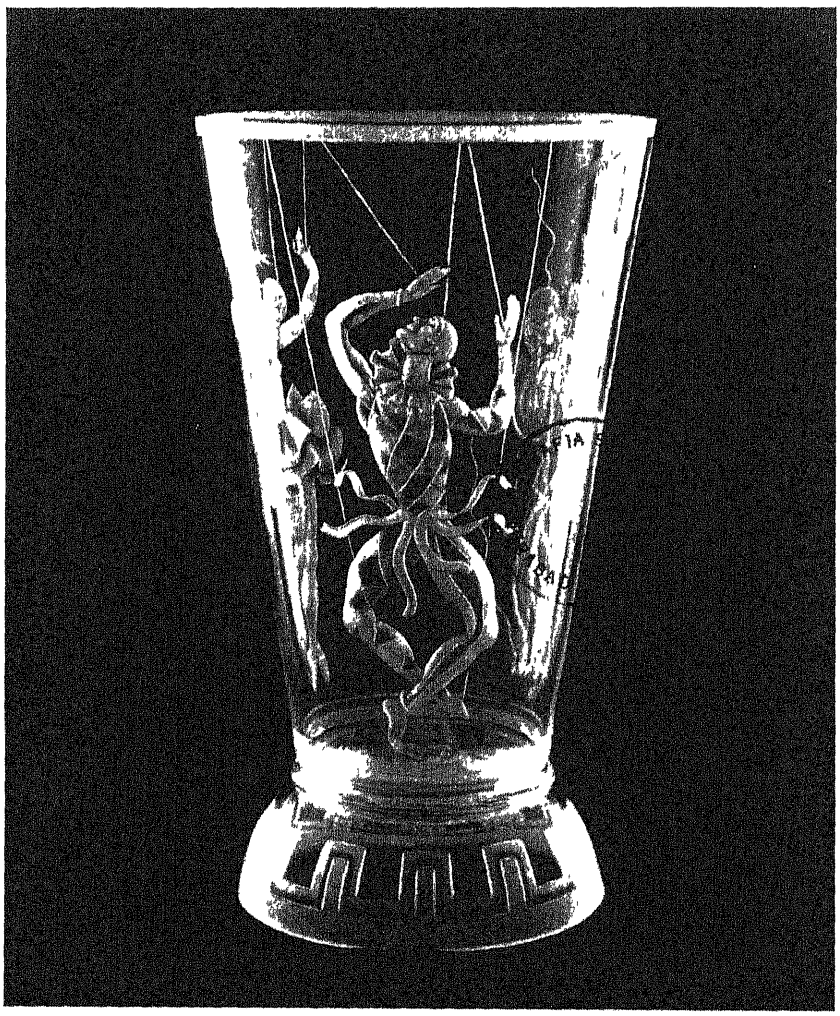
VENINI, S. A., MURANO VASES OF COLOURED BLOWN GLASS (ABOVE), CZERNY FRERES, WARSAW TABLE WARE AND PLATTER OF CUT CRYSTAL (BELOW)

*Photo Photo Plat*

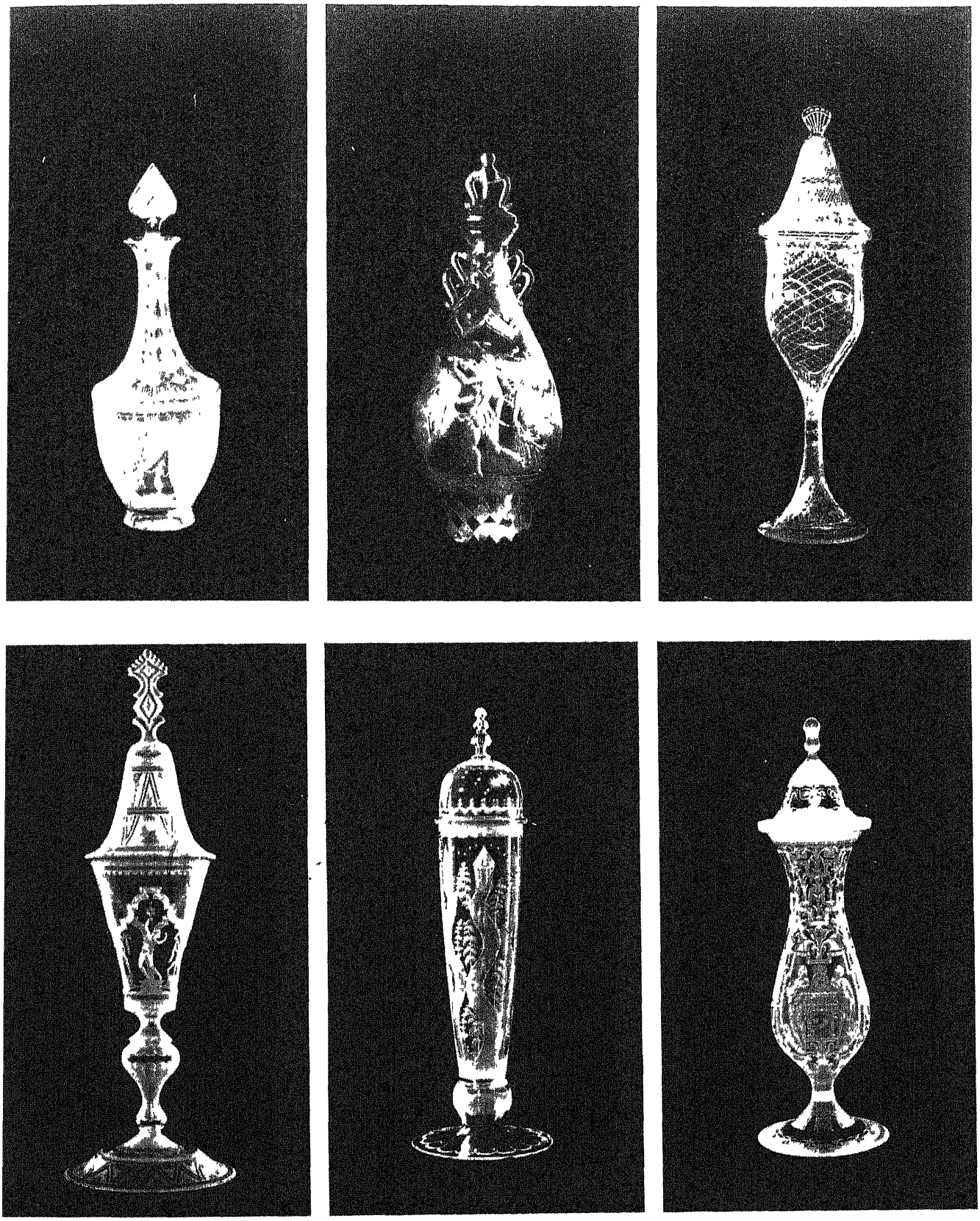




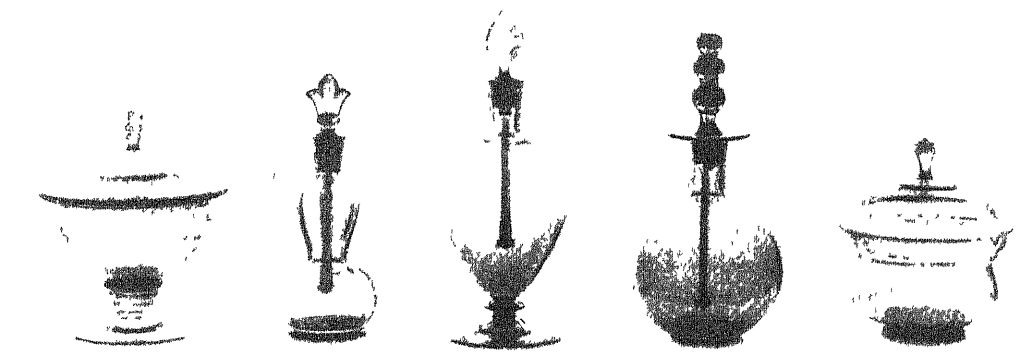
WIENER WERKSTAETTE, VIENNA CUT GLASS TEA SERVICE, DESIGNED BY JOSEF HOFFMANN

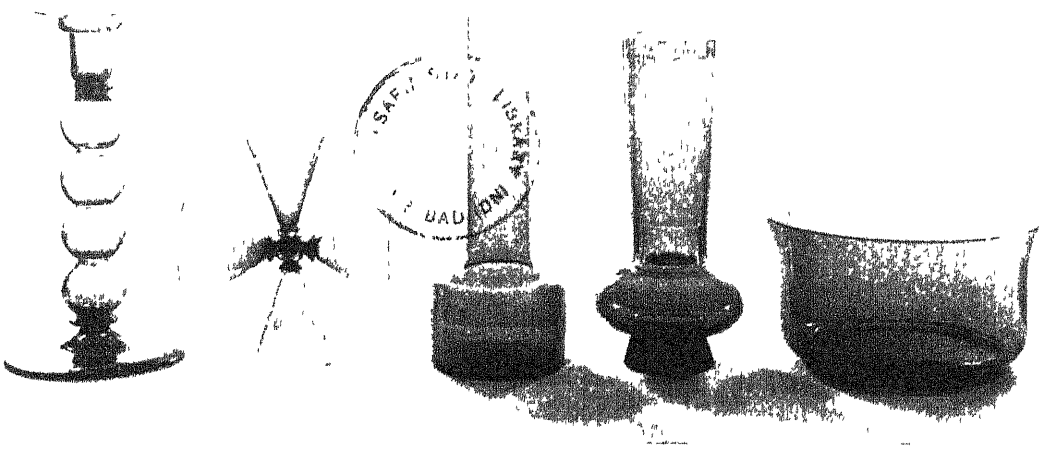


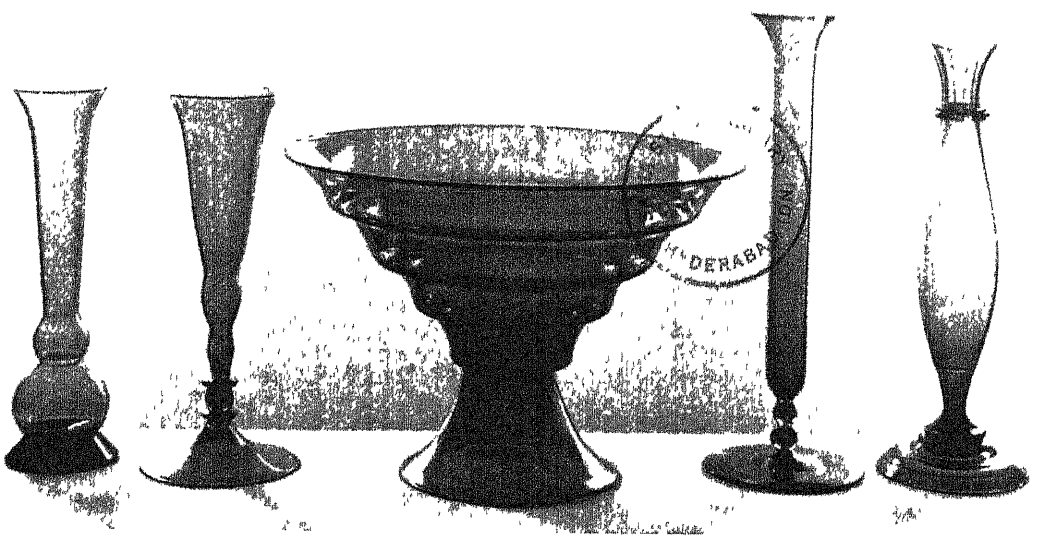
ORREFORS GLASBRUK, SWEDEN. ENGRAVED GLASS GOBLET, DESIGNED BY V. LINDSTRAND



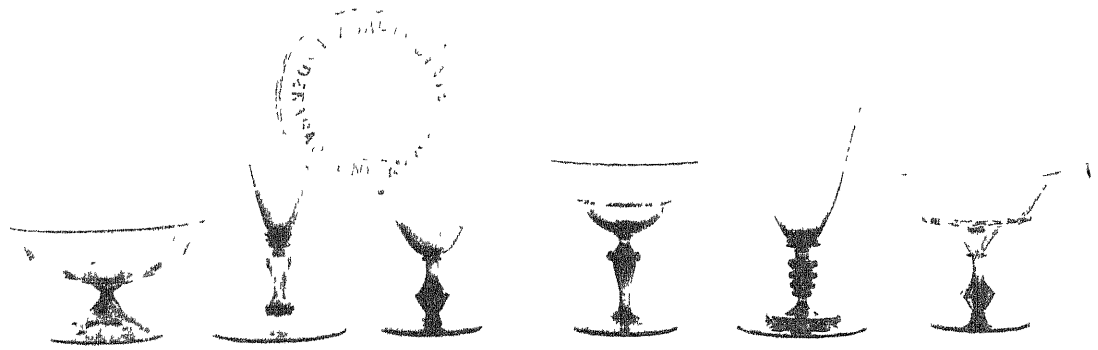
ORREFORS GLASBRUK, SWEDEN. CRYSTAL WARE ENGRAVED WITH THE WHEEL
DESIGNS BY SIMON GATE AND EDVARD HALD

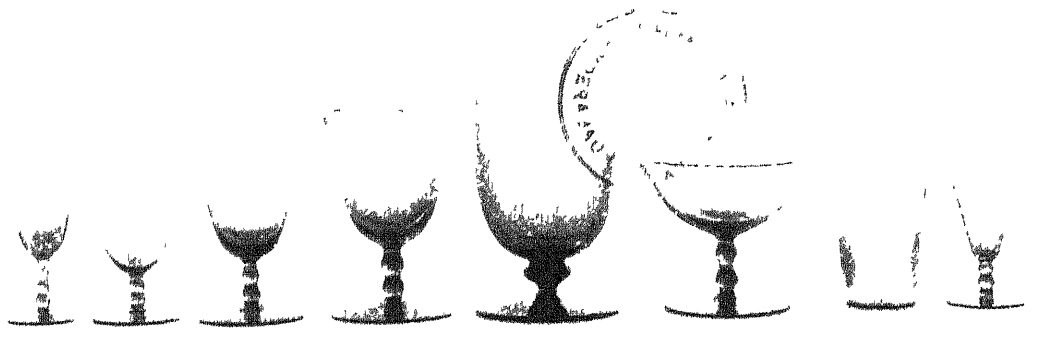


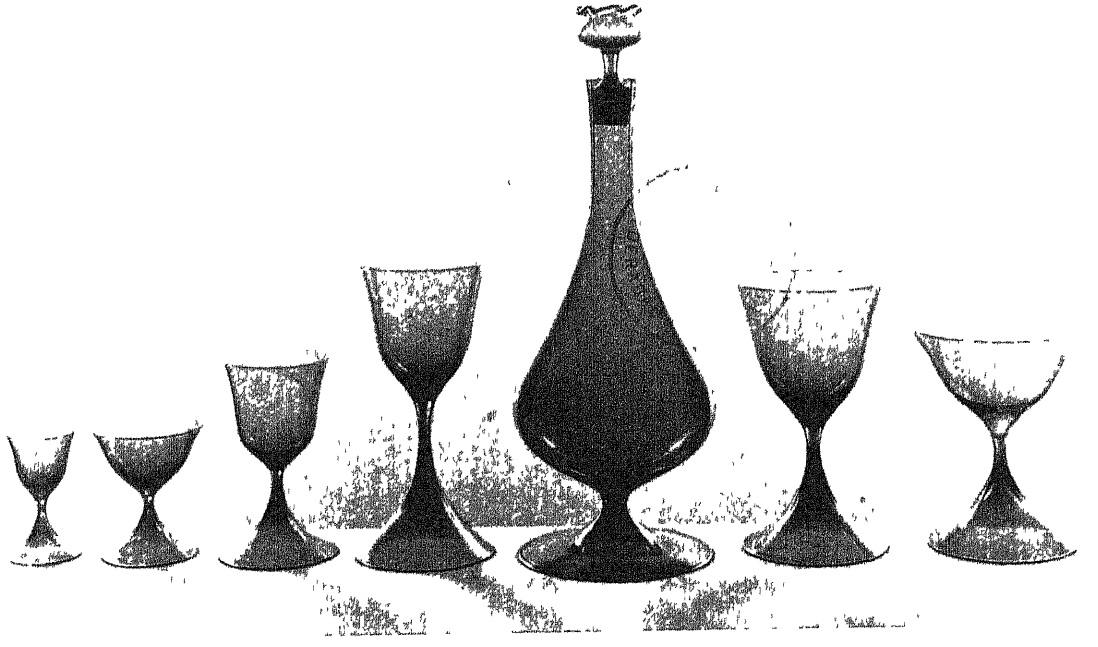




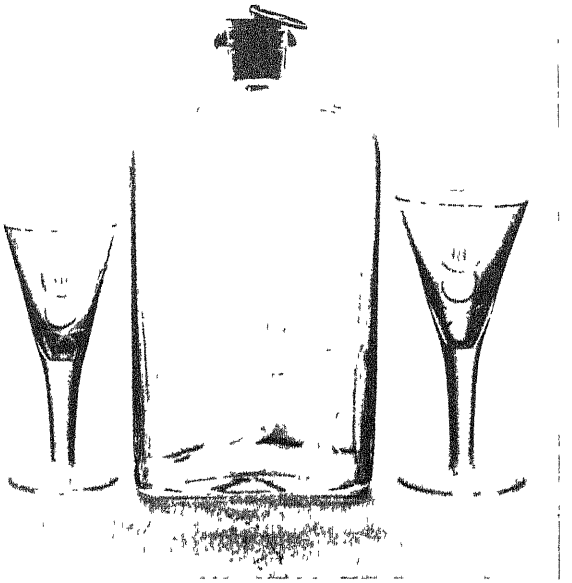
ORRLFORS GLASBRUK (SANDVIK), SWEDEN TABLE WARE IN COLOURED SODA GLASS

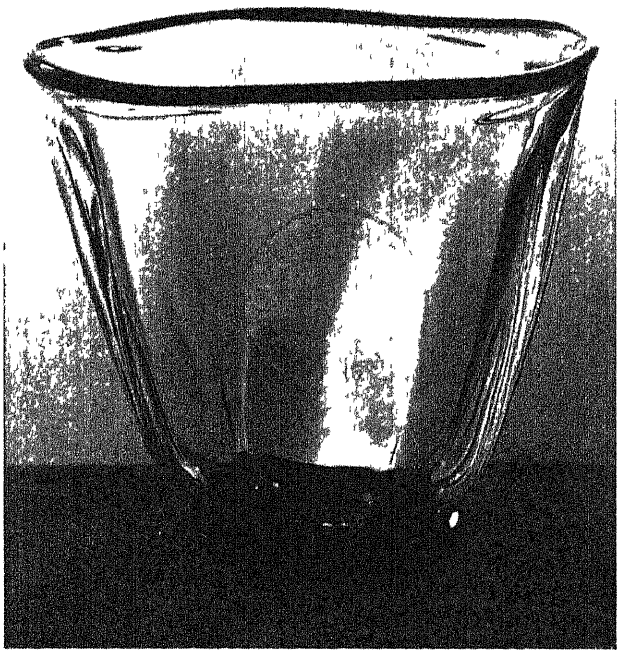




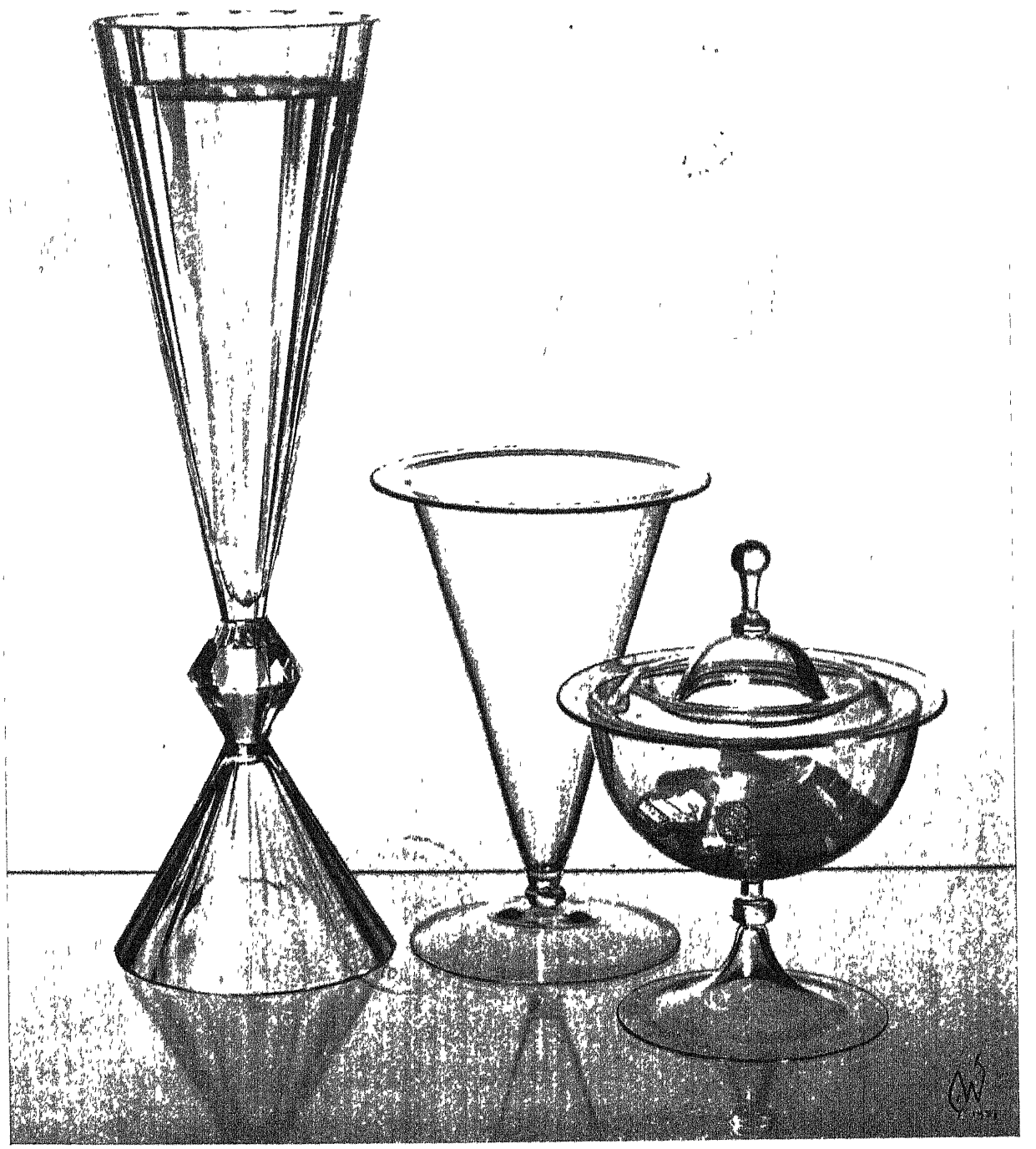


ORREFORS GLASBRUK (SANDVIK), SWEDEN TABLE WARE IN COLOURED SODA GLASS

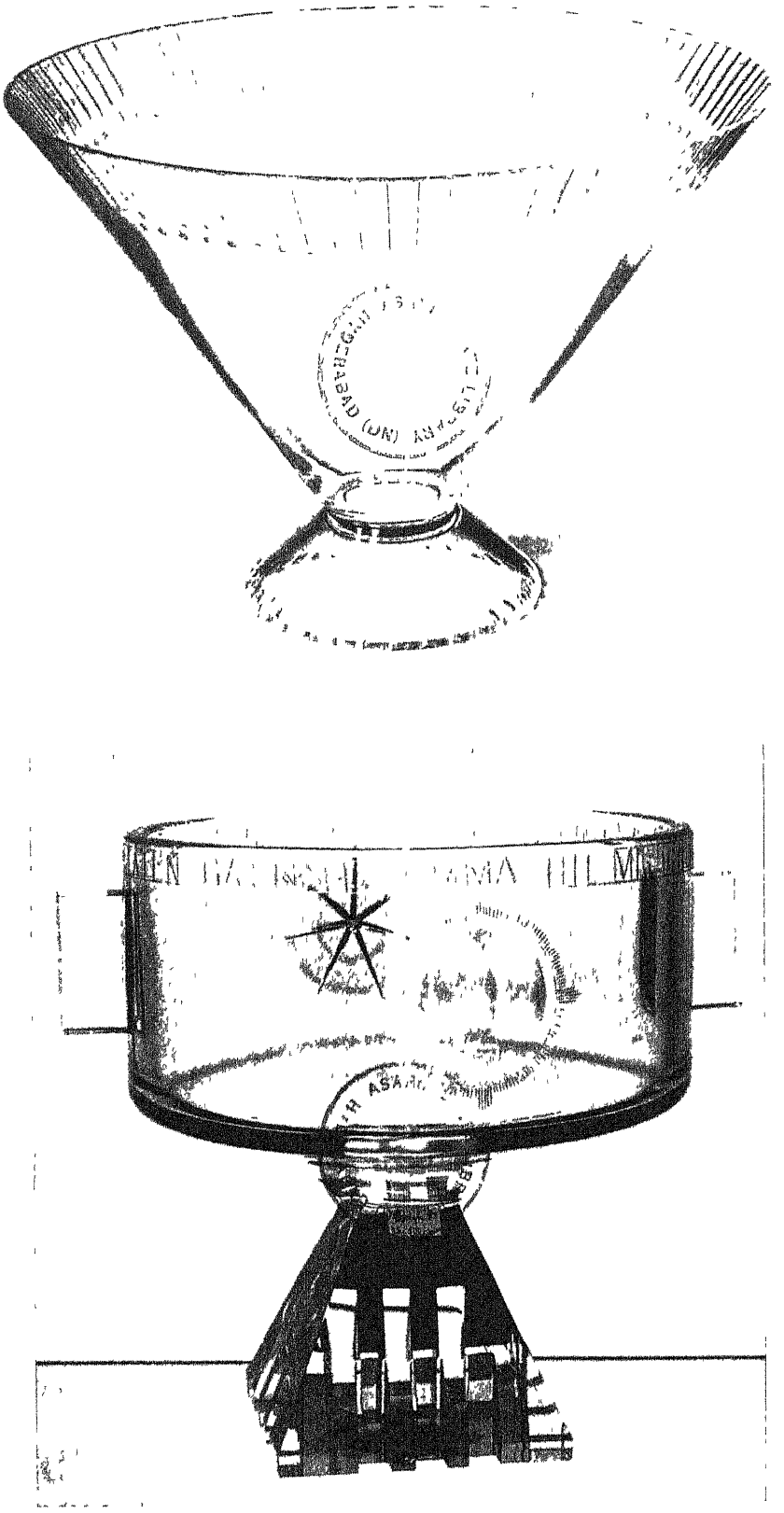




ORREFORS GLASBRUK, SWEDEN DESIGNS BY SIMON GATE AND EDVARD HALD
IN CUT, ENGRAVED, BLOWN AND ENAMELLED CRYSTAL

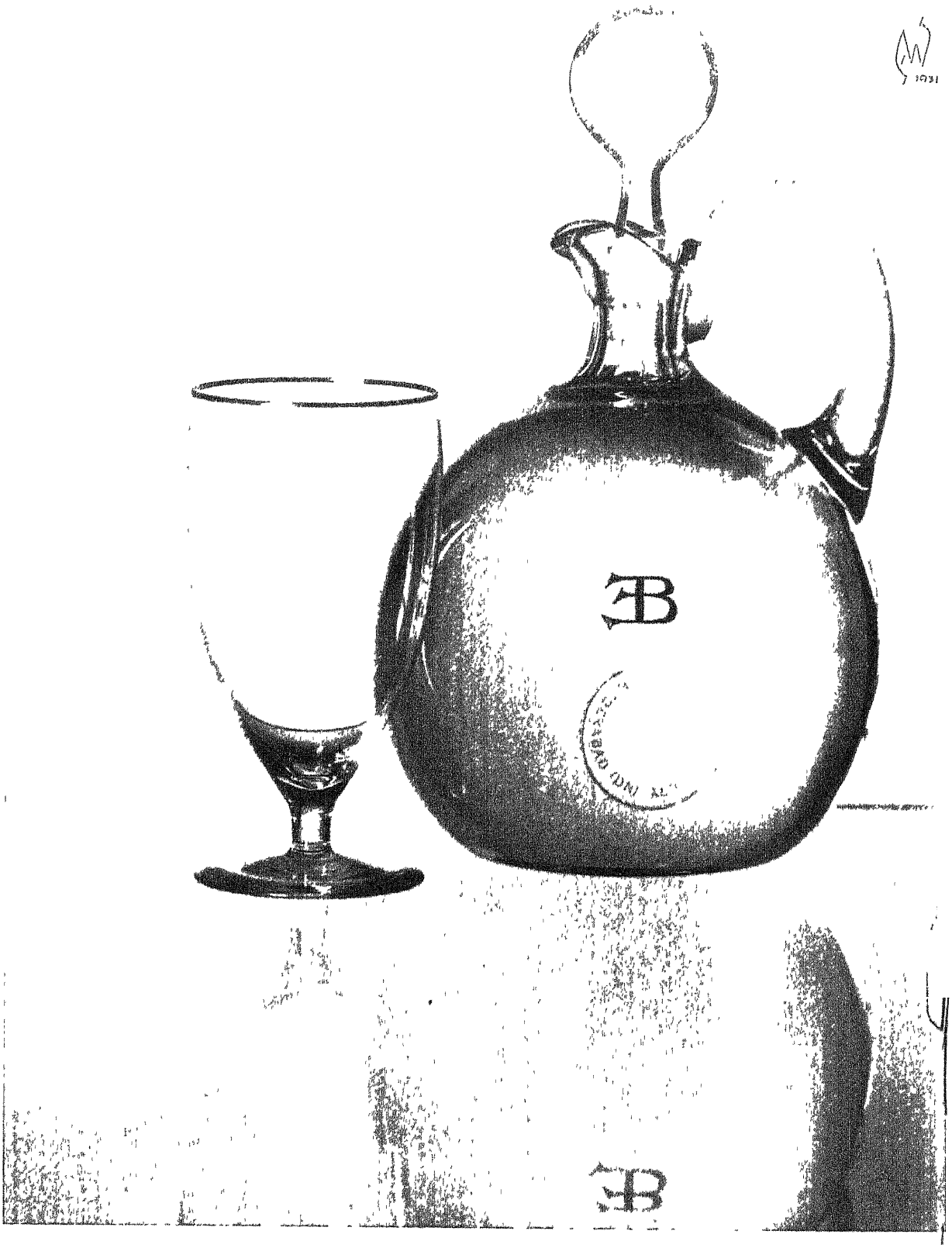


KOSTA GLASBRUK, SWEDEN · VASES AND SWEET DISH IN CUT AND BLOWN GLASS, DESIGNED BY ELIS BERGH

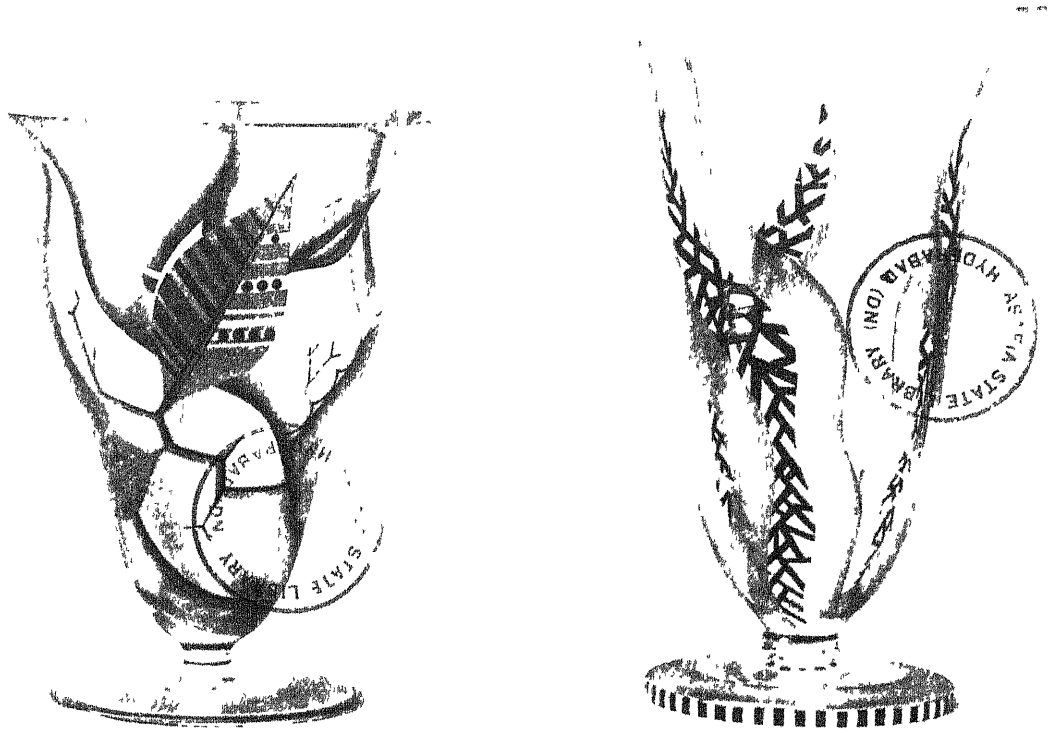


KOSTA GLASBRUK, SWEDEN FRUIT BOWL AND CHALICE IN BLOWN GLASS, DESIGNED BY ELIS BERGH


KOSTA GLASBRUK, SWEDEN: BLOWN AND INGRAVED GLASSWARE, DESIGNED BY ELIS BERGH



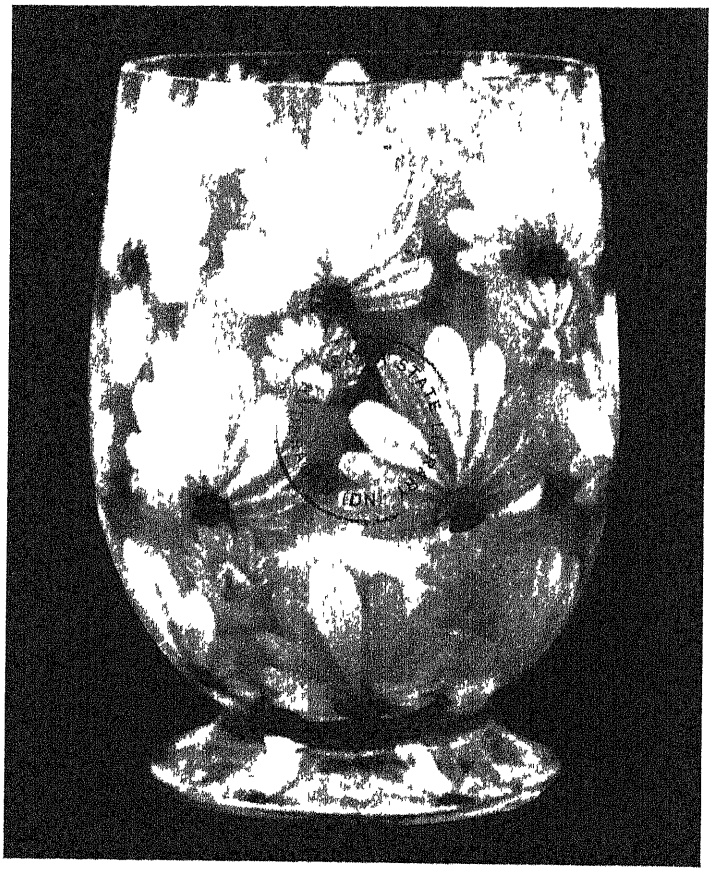
KOSTA GLASBRUK, SWEDEN DECANTER AND GOBLET IN BLOWN GLASS, DESIGNED BY ELIS BERGH



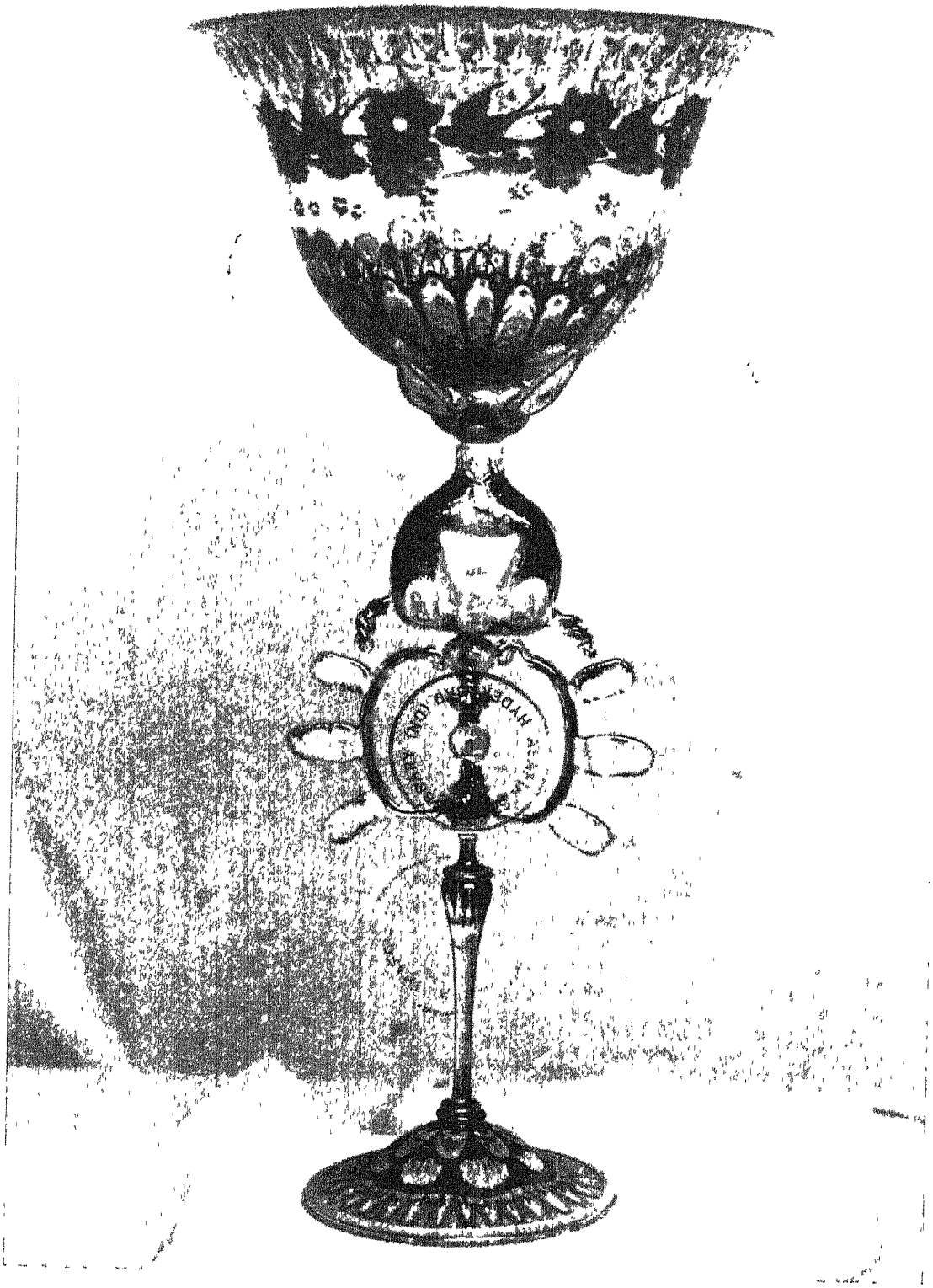
BOR HAVDA TECHNICAL SCHOOL, PAINTED GOBLETS, DESIGNED IN PROFESSOR PECHL'S DEPARTMENT

*Photo Courtesy "Little Gallery"*

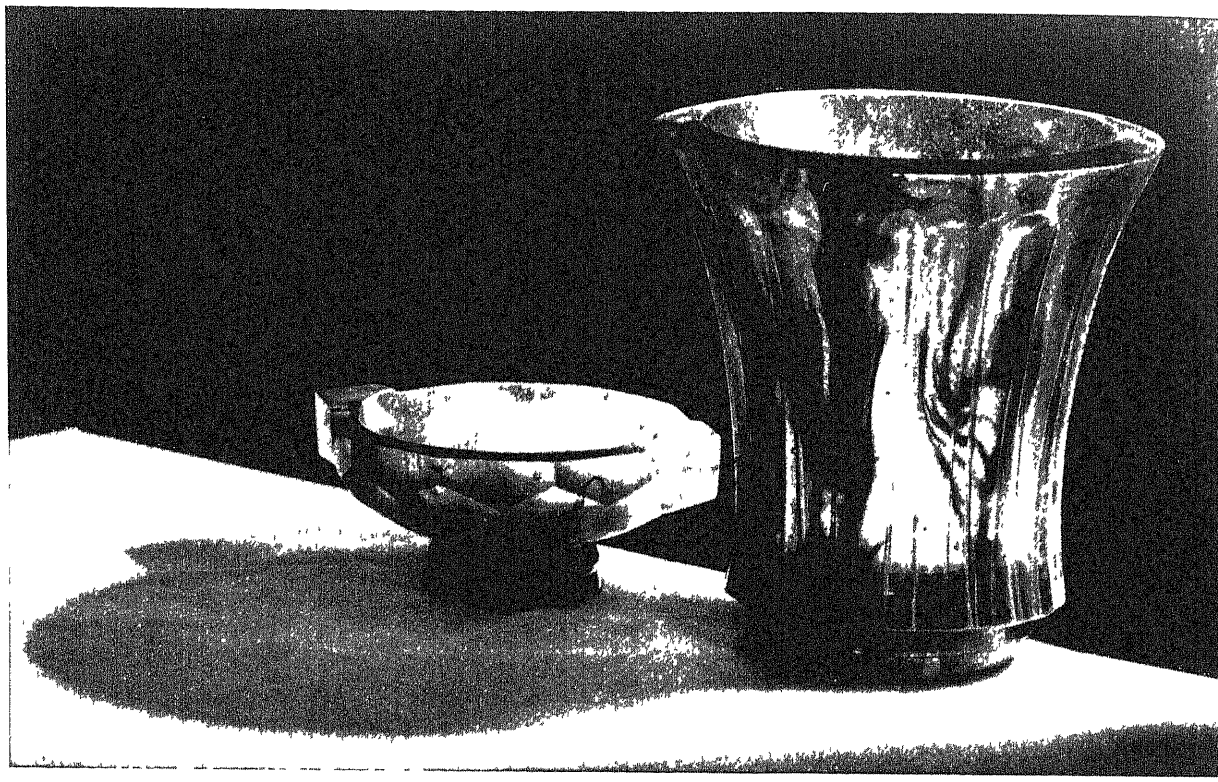
ORRIFORS GLASBRUK, SWEDEN: WHITE ENGRAVED GLASSWARE



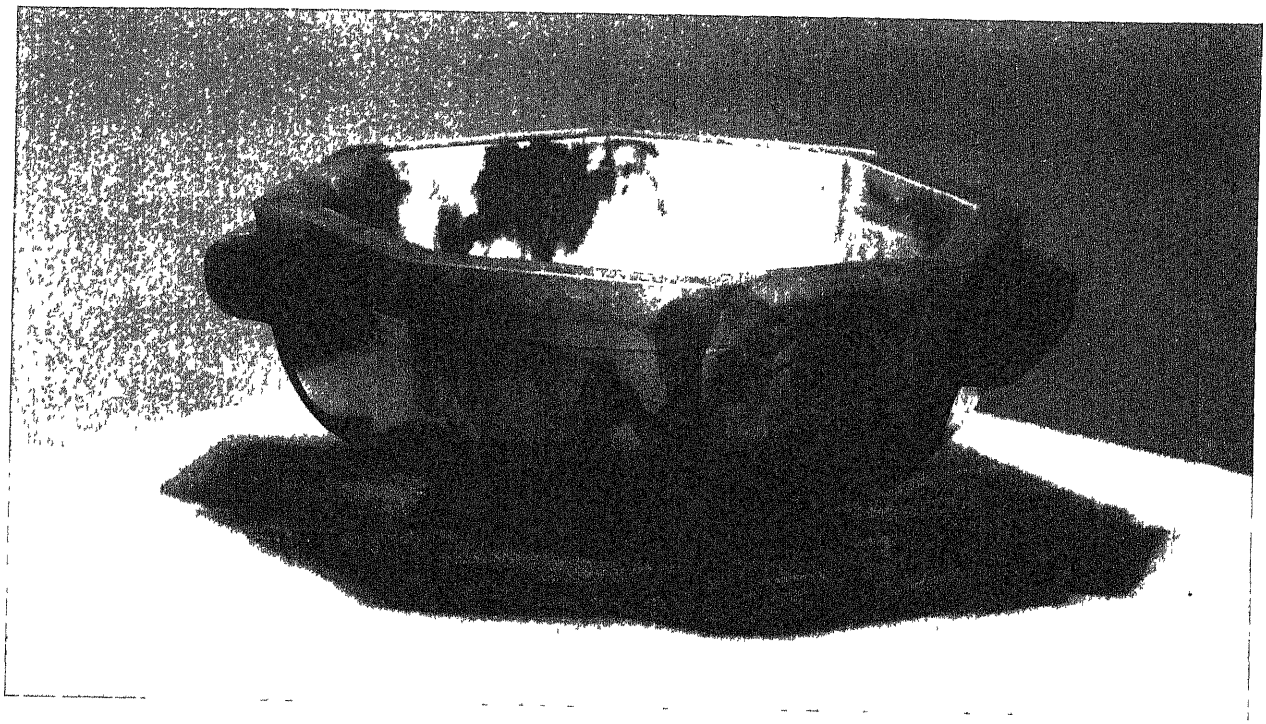
JOSÉ MARIA GOL, BARCELONA: BOWL AND VASES
WITH TRANSLUCENT ENAMEL DECORATION



JOSÉ MARIA GOL, BARCELONA. ORNAMENTAL GOBLET, RICHLY DECORATED WITH ENAMEL

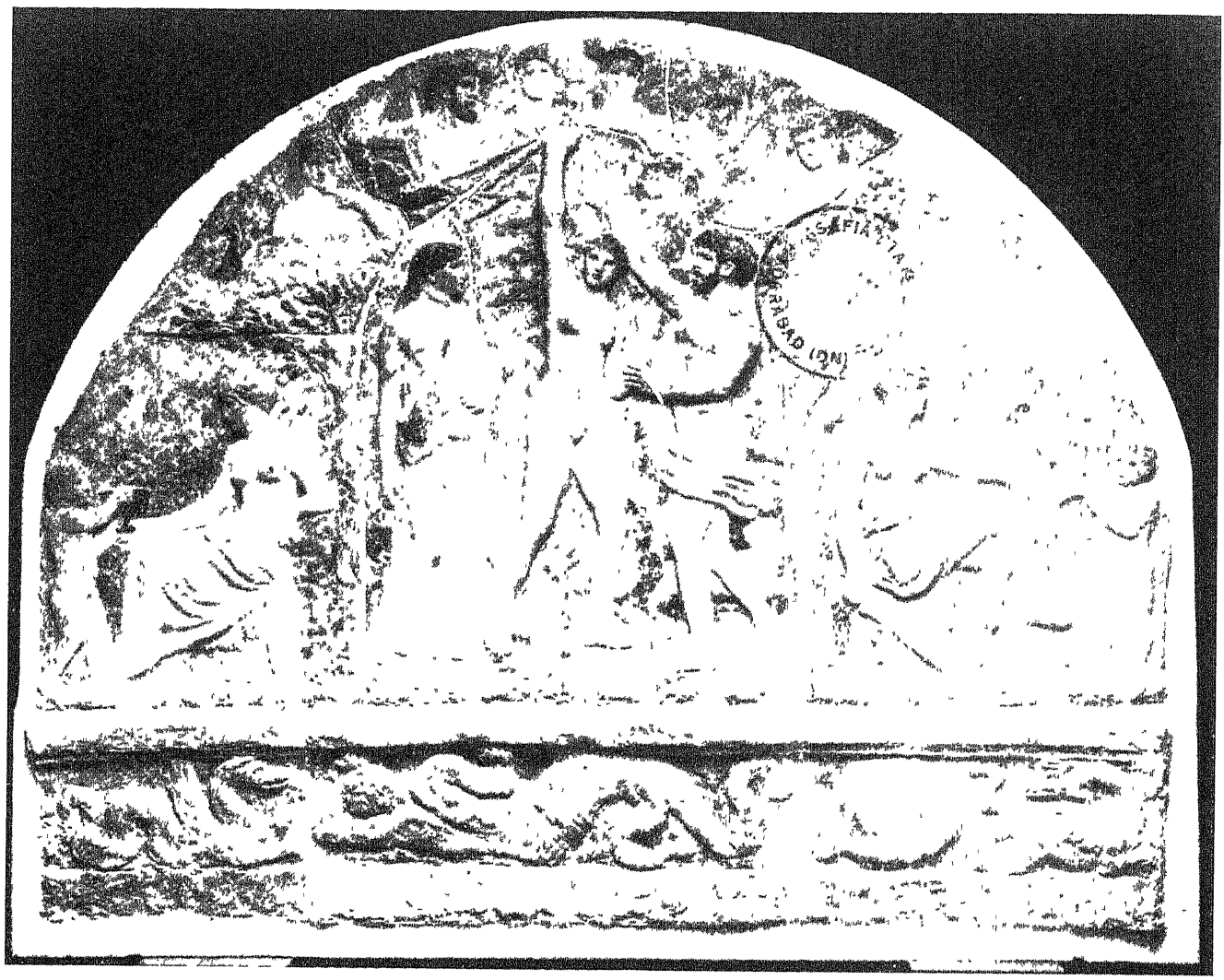


FRANÇOIS DÉCORCHEMONT VASES AND BOWLS IN TRANSLUCENT, RICHLY COLOURED GLASS PASTE PRODUCED BY G. ROUARD

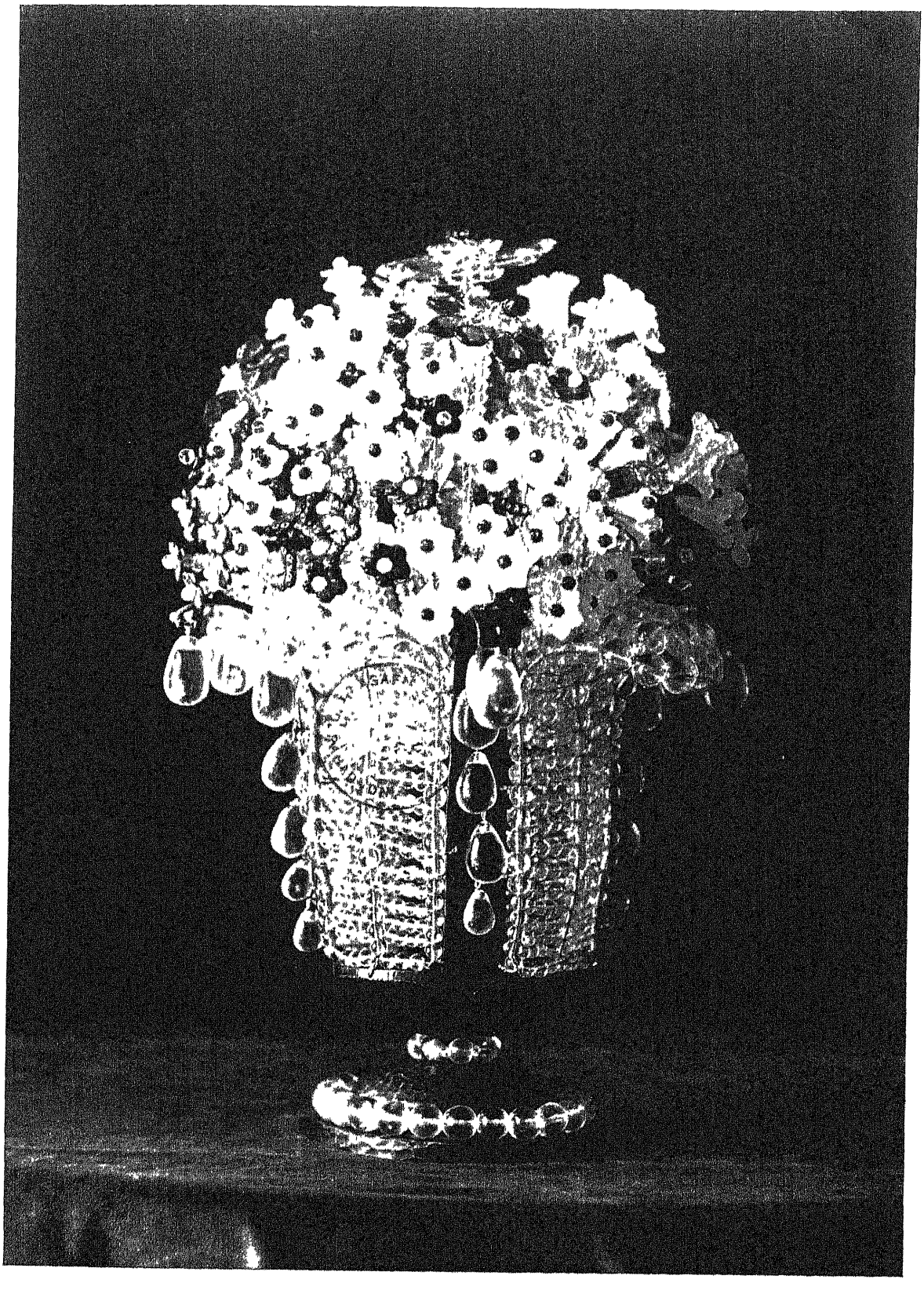


FRANÇOIS DECORCHEMONT · BOWL IN TRANSLUCENT GLASS PASTE · PRODUCED BY G. ROUARD

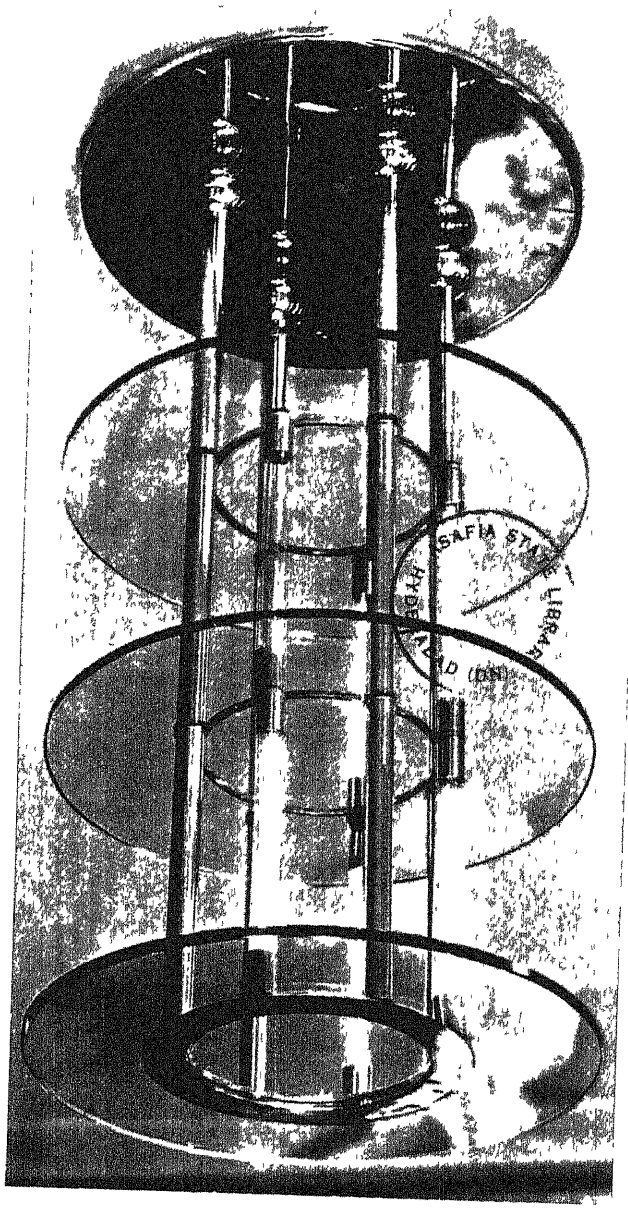
ALBERT DAMMOUSE · VASE IN PASTE OF ENAMEL

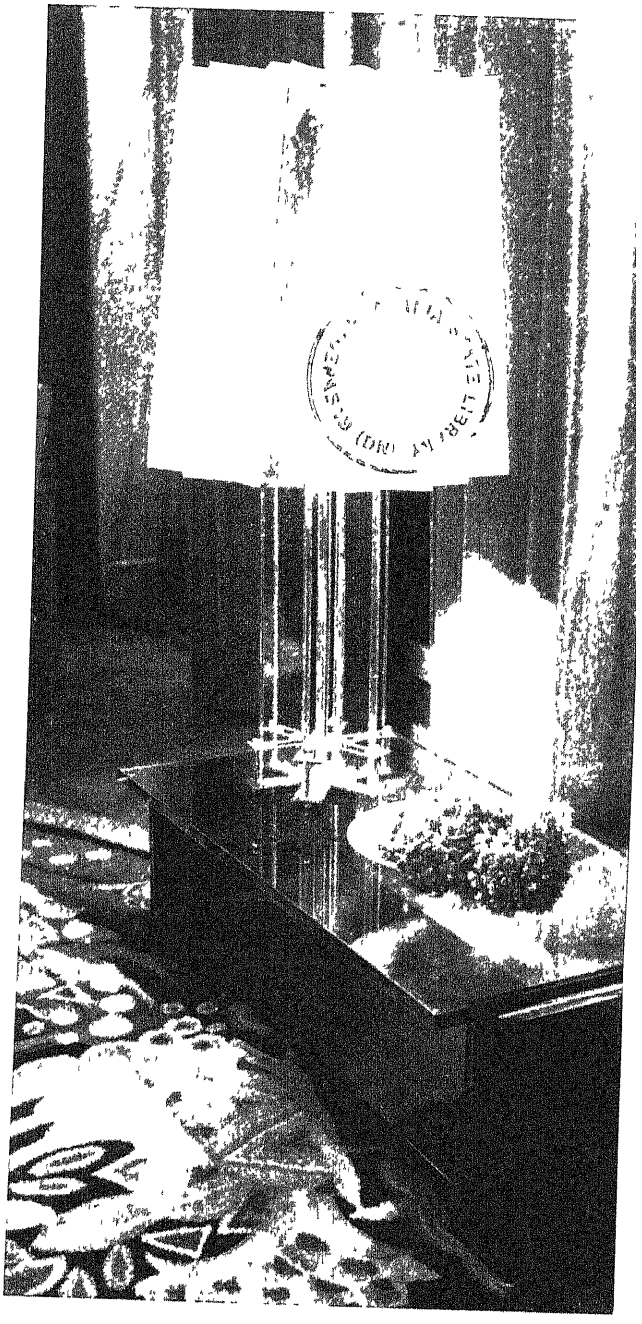


HENRY CROS, PARIS BAS RELIEF IN COLOURED GLASS PASTE

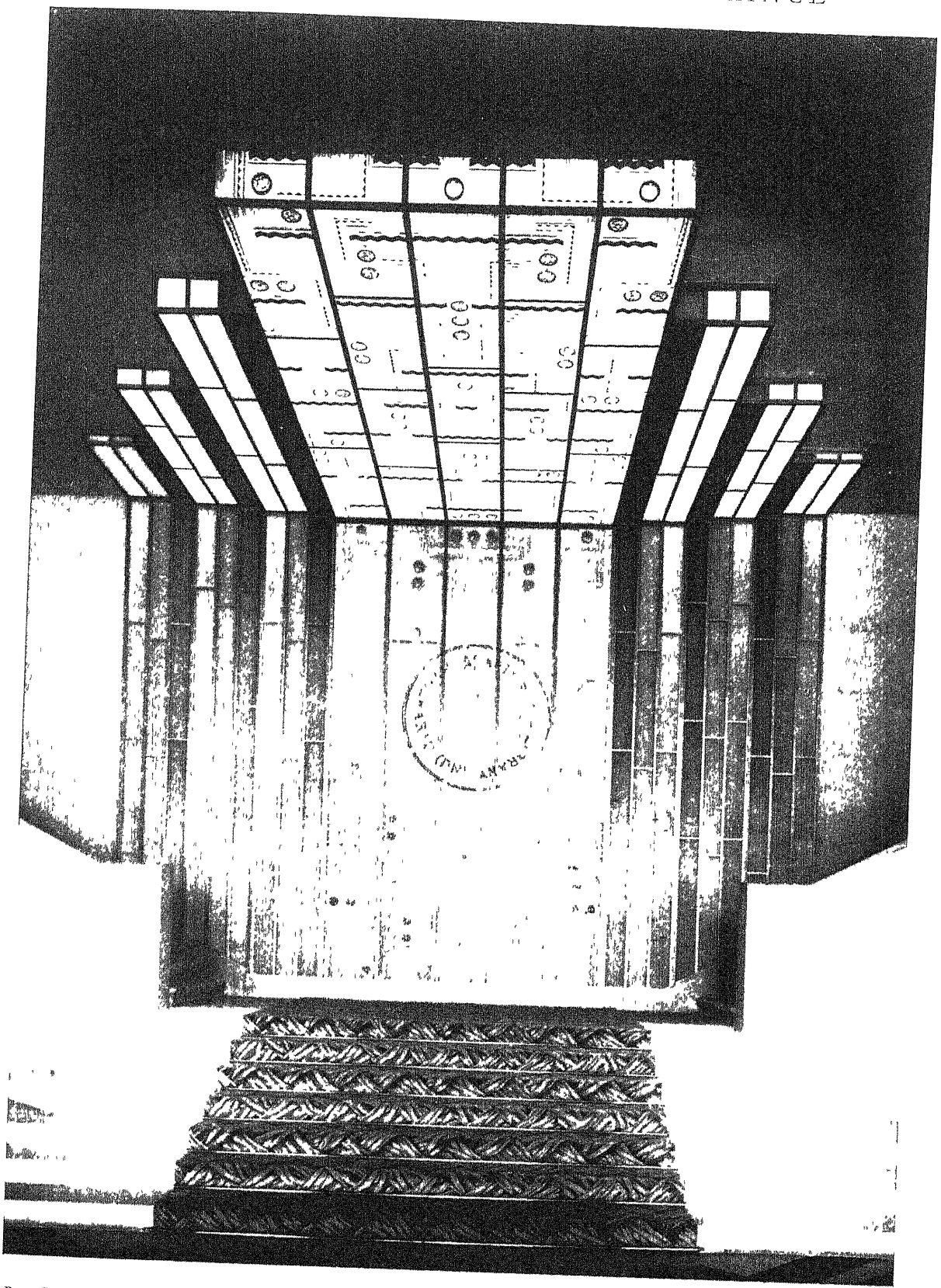


LOUIS SUE AND ANDRE MARE, PARIS. TABLE LAMP OF CRYSTALS AND FORGED STEEL

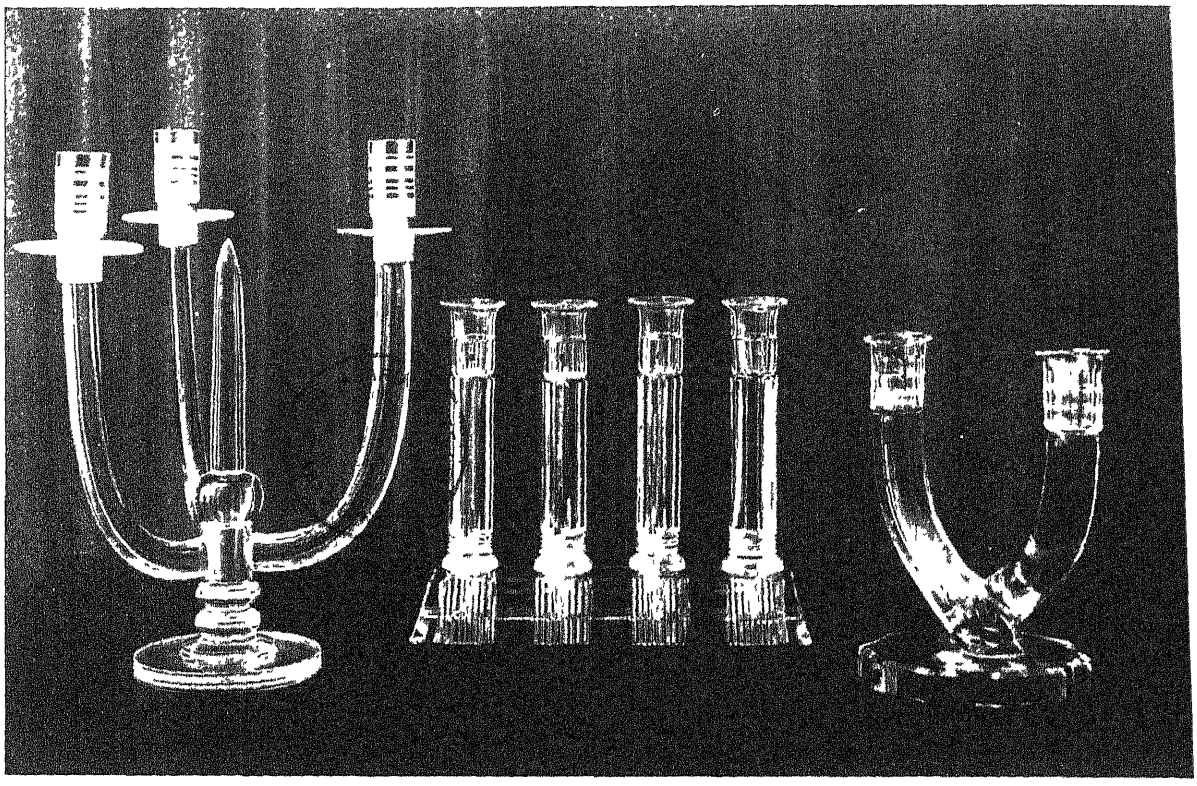




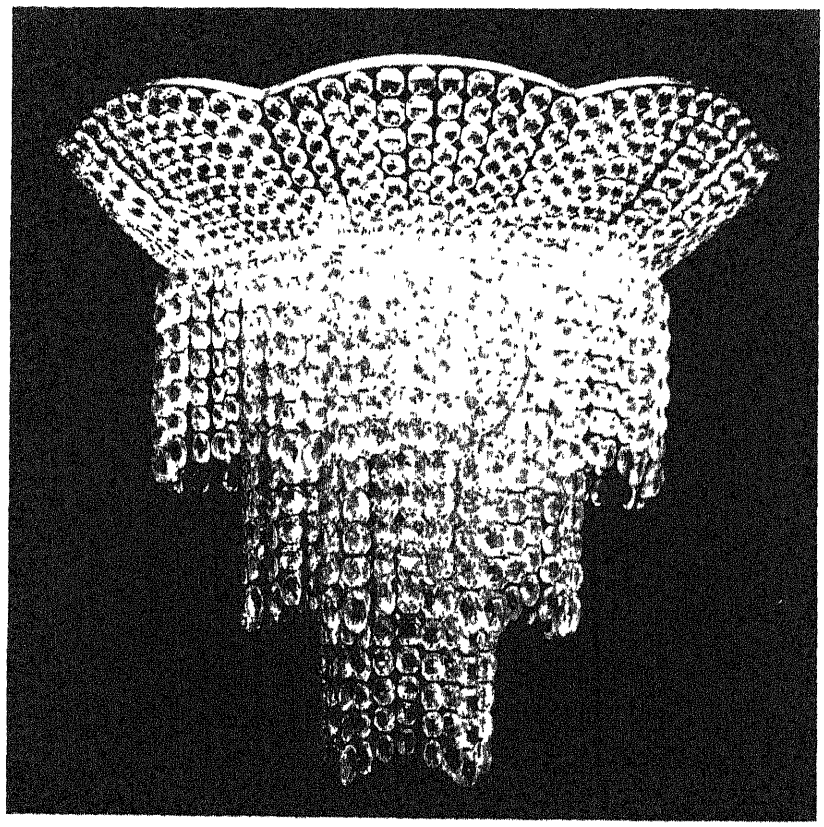
MAURICE DUFRÈNE, PARIS. HANGING LAMP AND STANDARD IN PLATE GLASS. PRODUCED BY GIL. DES ARTS FRANÇAIS

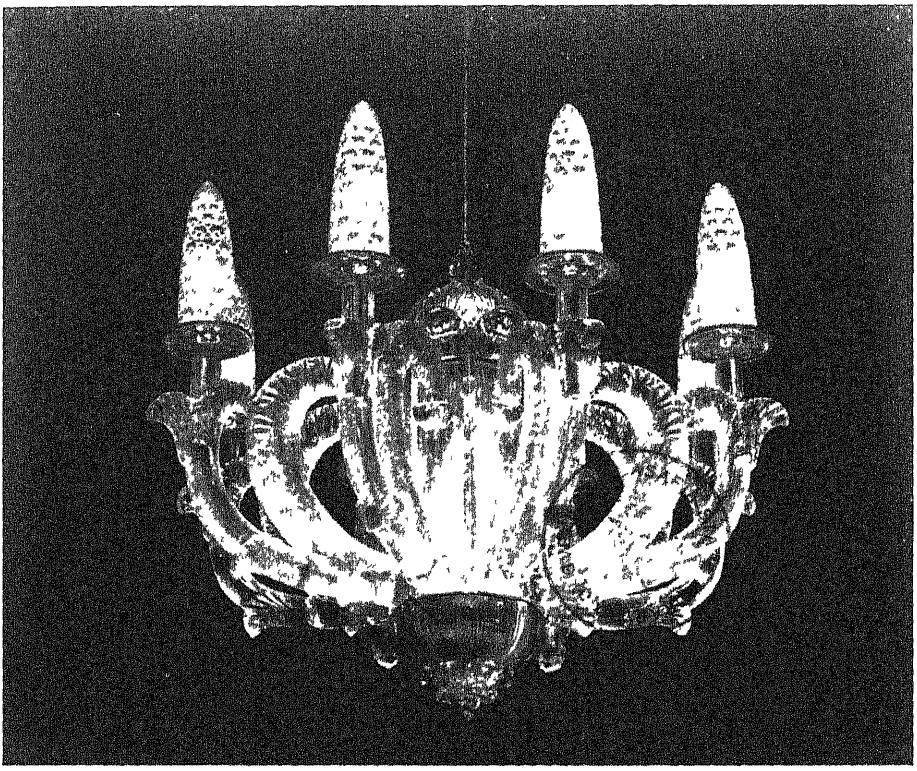


P GENET & L MICHON, PARIS: ILLUMINATED PANELS IN THE HALL OF HOTEL SPLENDID, DAX ENGRAVED GLASS TILES ENCRUSTED WITH CABOCHONS OF PRESSED GLASS

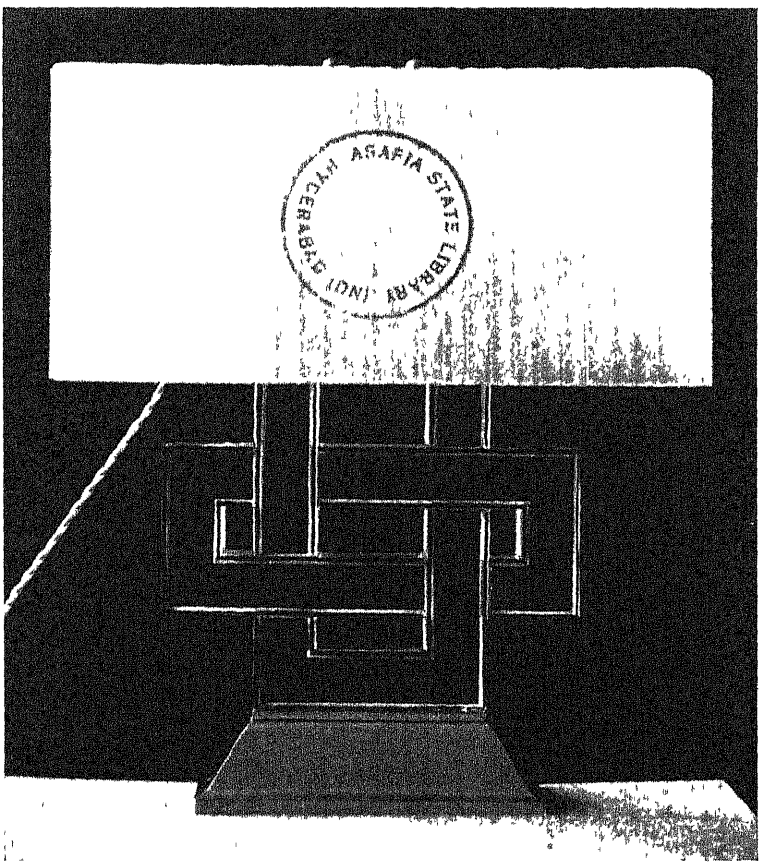


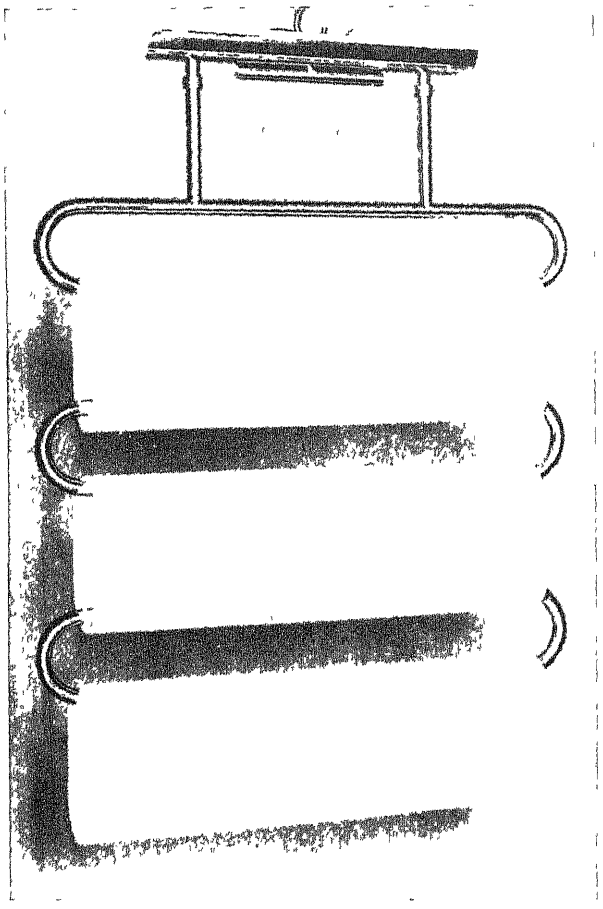
JOSEF GERNER, BOR HAIDA CRYSTAL CANDLESTICKS AND CHANDELIER (ABOVE)
GEORGES CHEVALIER, PARIS LUSTRE HANGING LAMP PRODUCED BY CRISTALLERIES DE BACCARAT (BELOW)



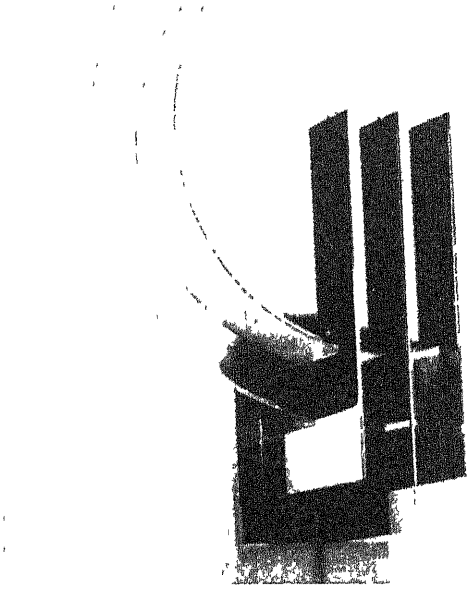


RENÉ LALIQUE, PARIS HANGING LUSTRE AND TABLE LAMP IN CRYSTAL

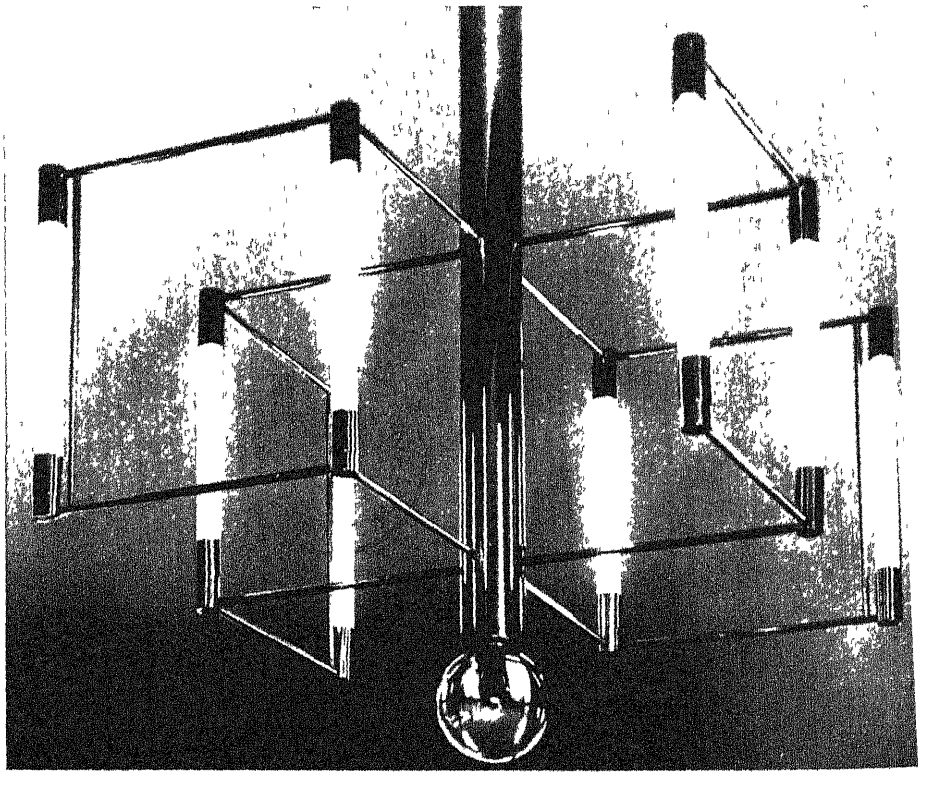




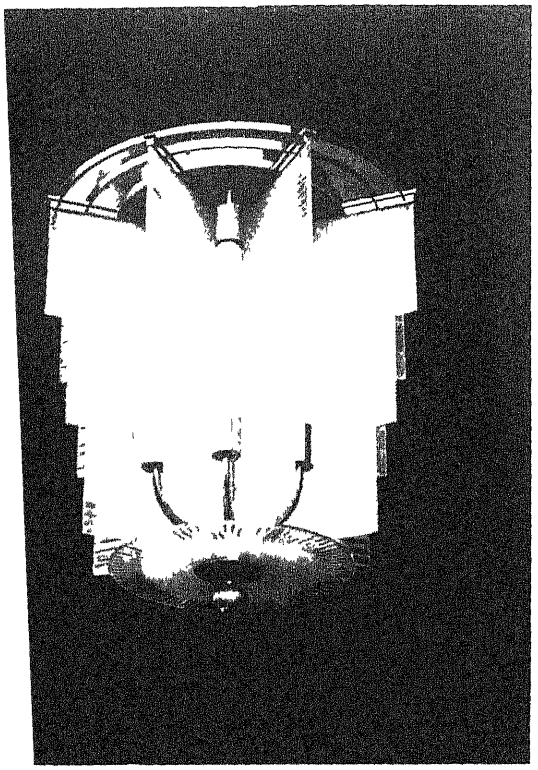
P CHILSA, MILAN HANGING LAMP OF OPAQUE GLASS CYLINDERS

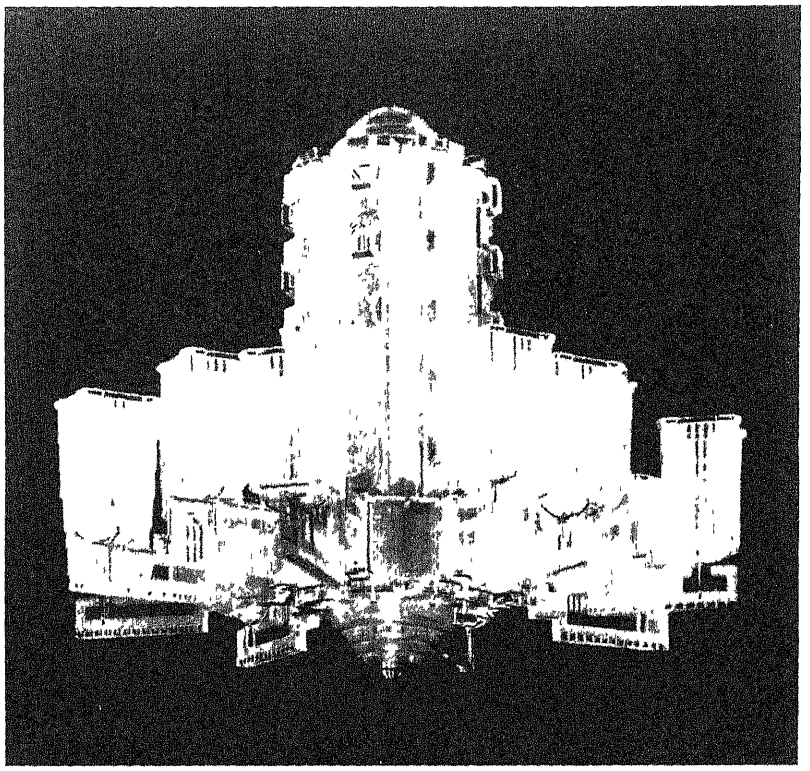


DESNY, PARIS WALL LAMP OF GLASS DISS AND METAL PLAQUES

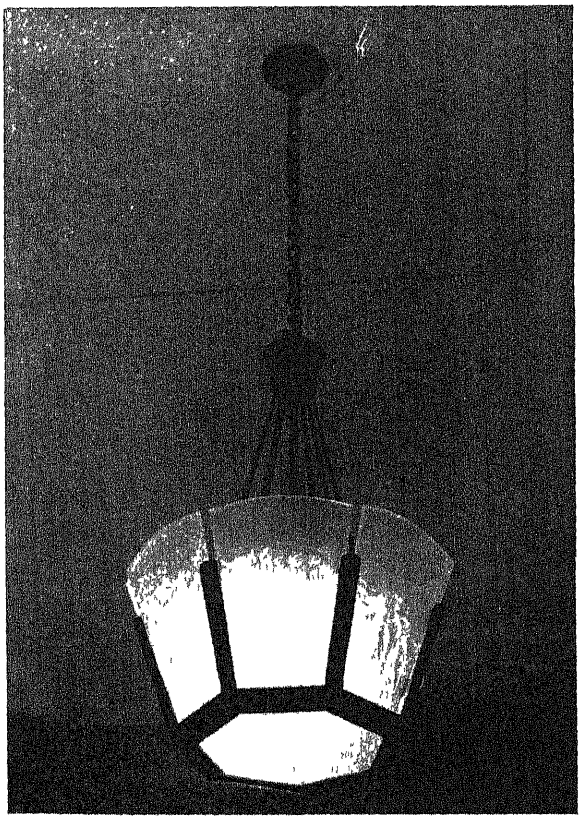


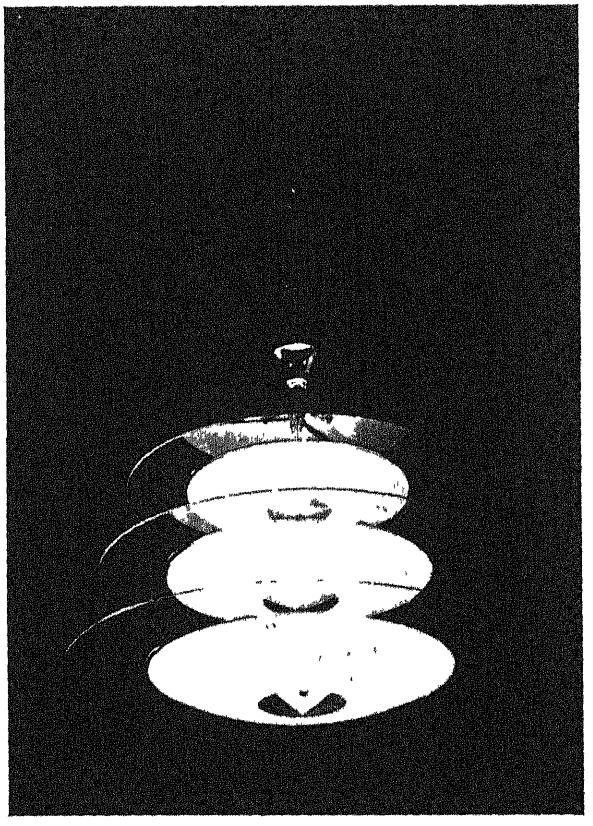
J J ADNET, PARIS HANGING LAMP OF TUBULAR BULBS SET IN POLISHED METAL



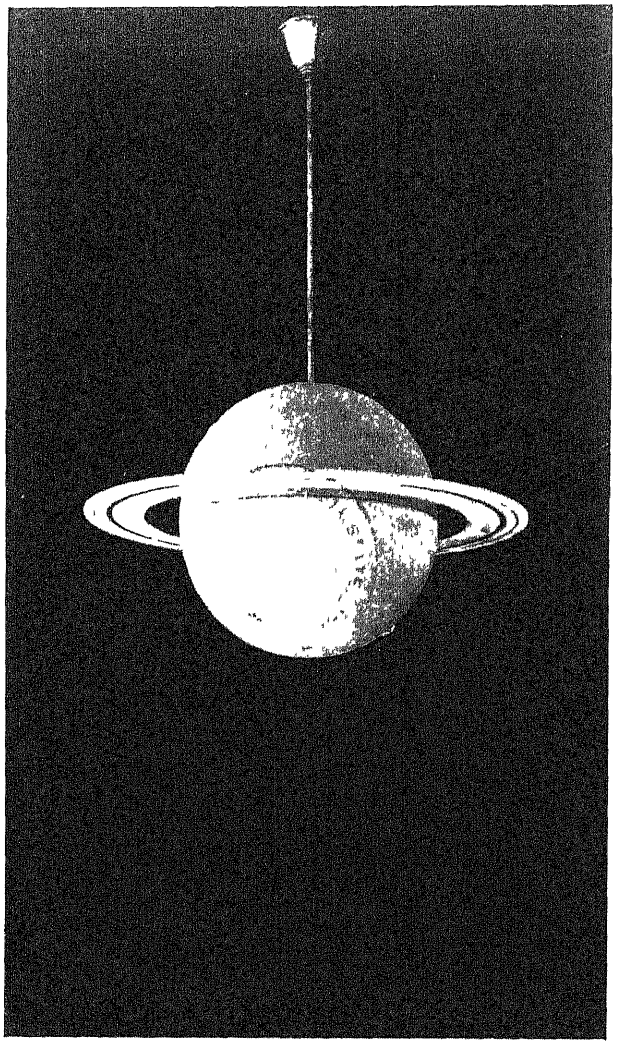


ARTLOMILJCZYK, WARSAW HANGING LAMP PRODUCED BY S MARCINIAK, S P , S A (ON LIFI) SABINO, PARIS LUSTRL IN PRISSFD GLASS (ON RIGHT)



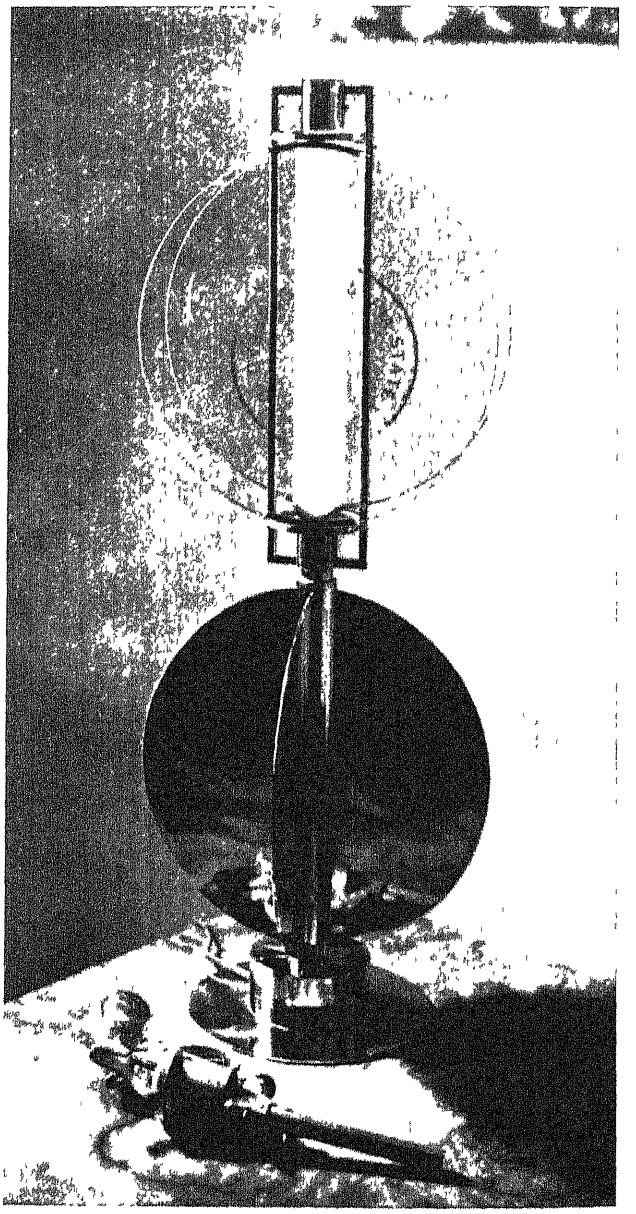


J J WALSH, LFD., BIRMINGHAM. HANGING LAMP IN OPAQUI GLASS WITH MOULDED PATTERN (ON LEFT) J & L. LOBMIYR, VIENNA ELECTROLIER IN CLEAR AND OPAQUL GLASS, MOUNTED CHROMO-NICKEL

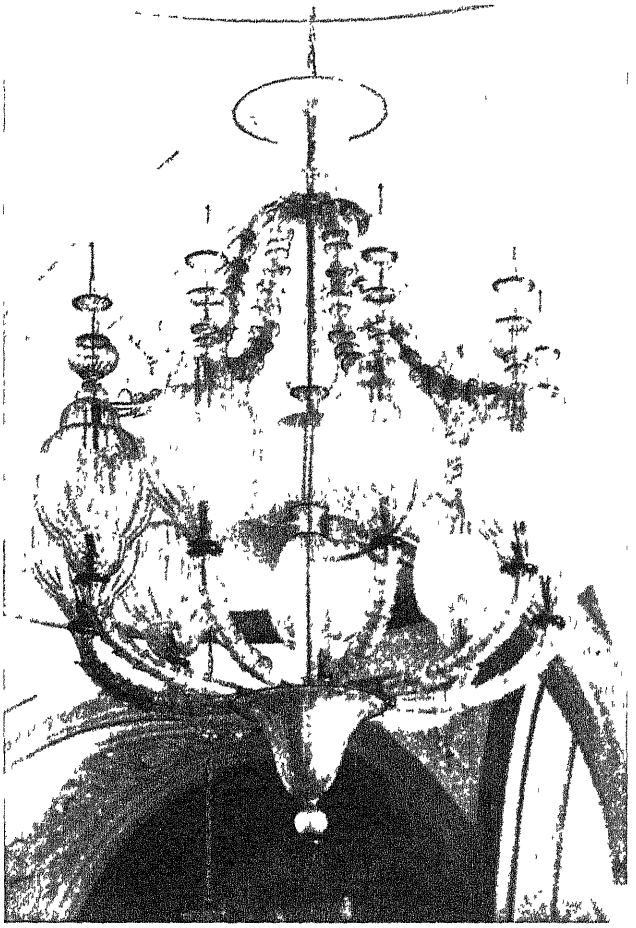


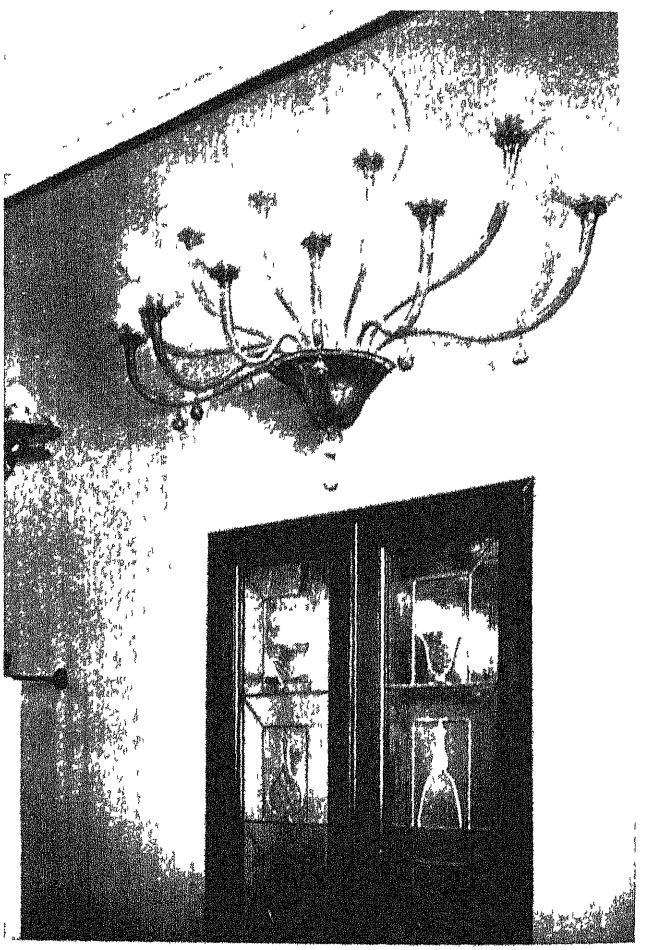
ORREFORS GLASBRUK, SWEDEN
SPHERICAL HANGING LAMP IN OPAQUE GLASS, DESIGNED BY EDVARD HALD

P. CHIESA, MILAN. TABLE LAMP OF GLASS AND METAL DISCS, DESIGNED BY LARCO

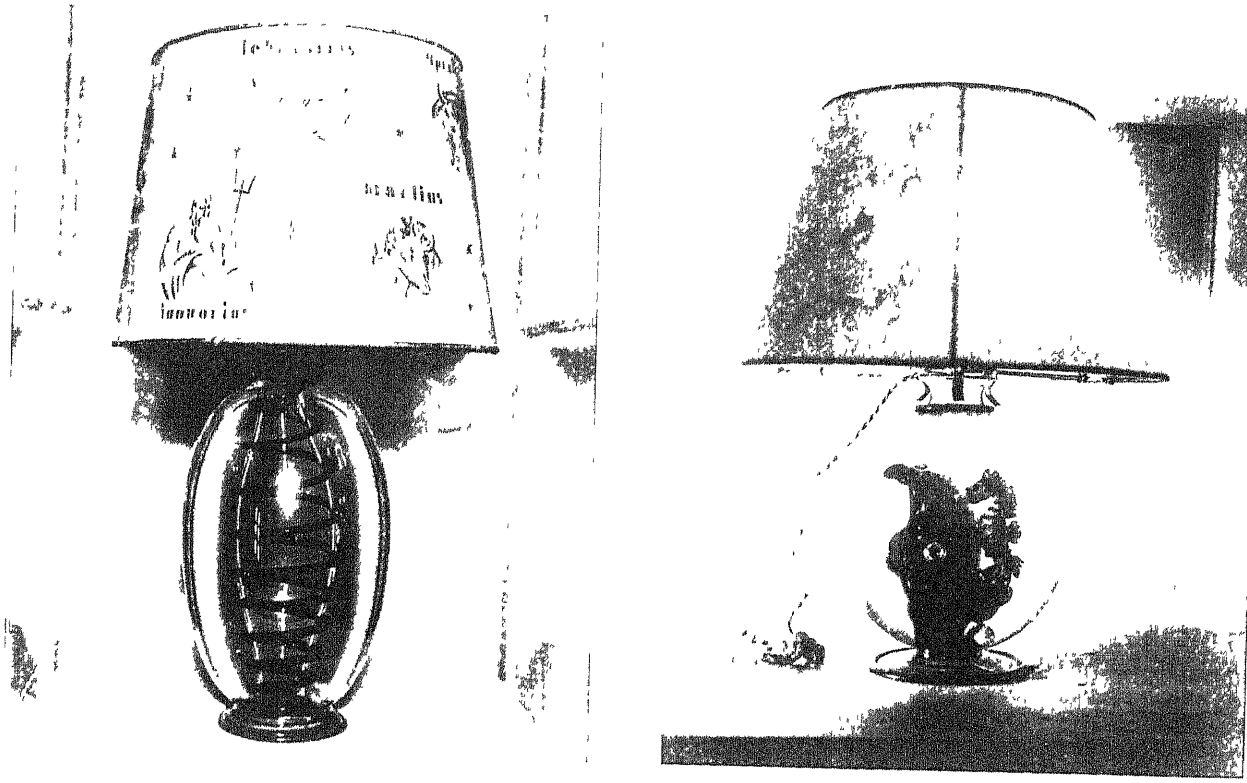


P. GINET & L. MICHON, PARIS TABLE LAMP OF PRESSED GLASS IN THE FORM OF A TERRESTRIAL GLOBE

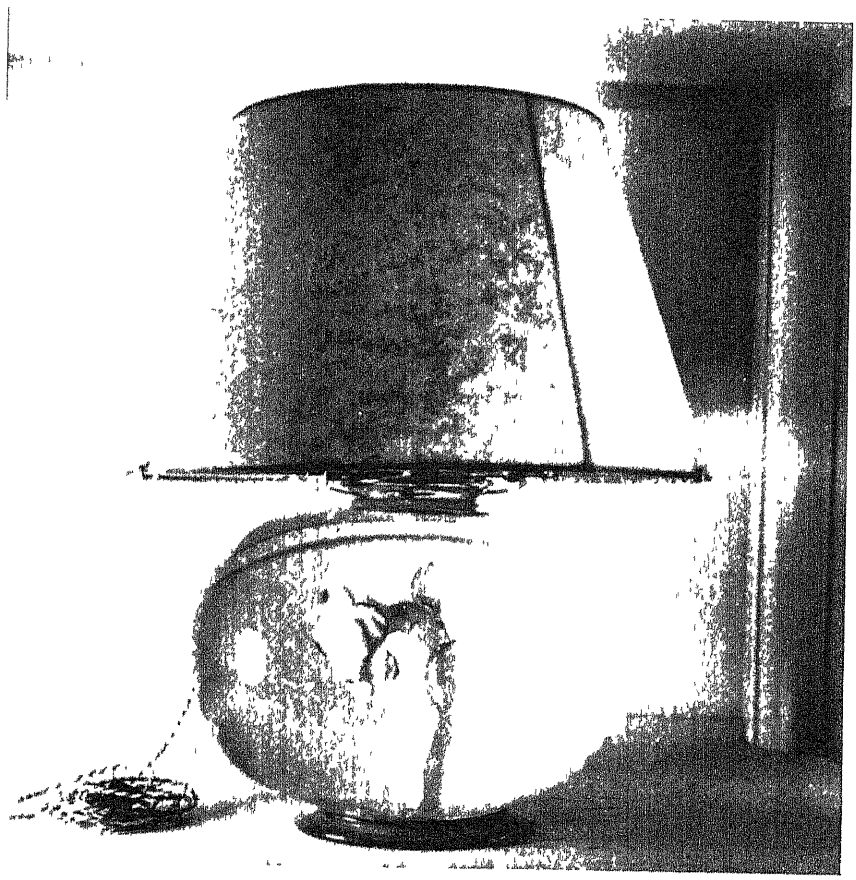


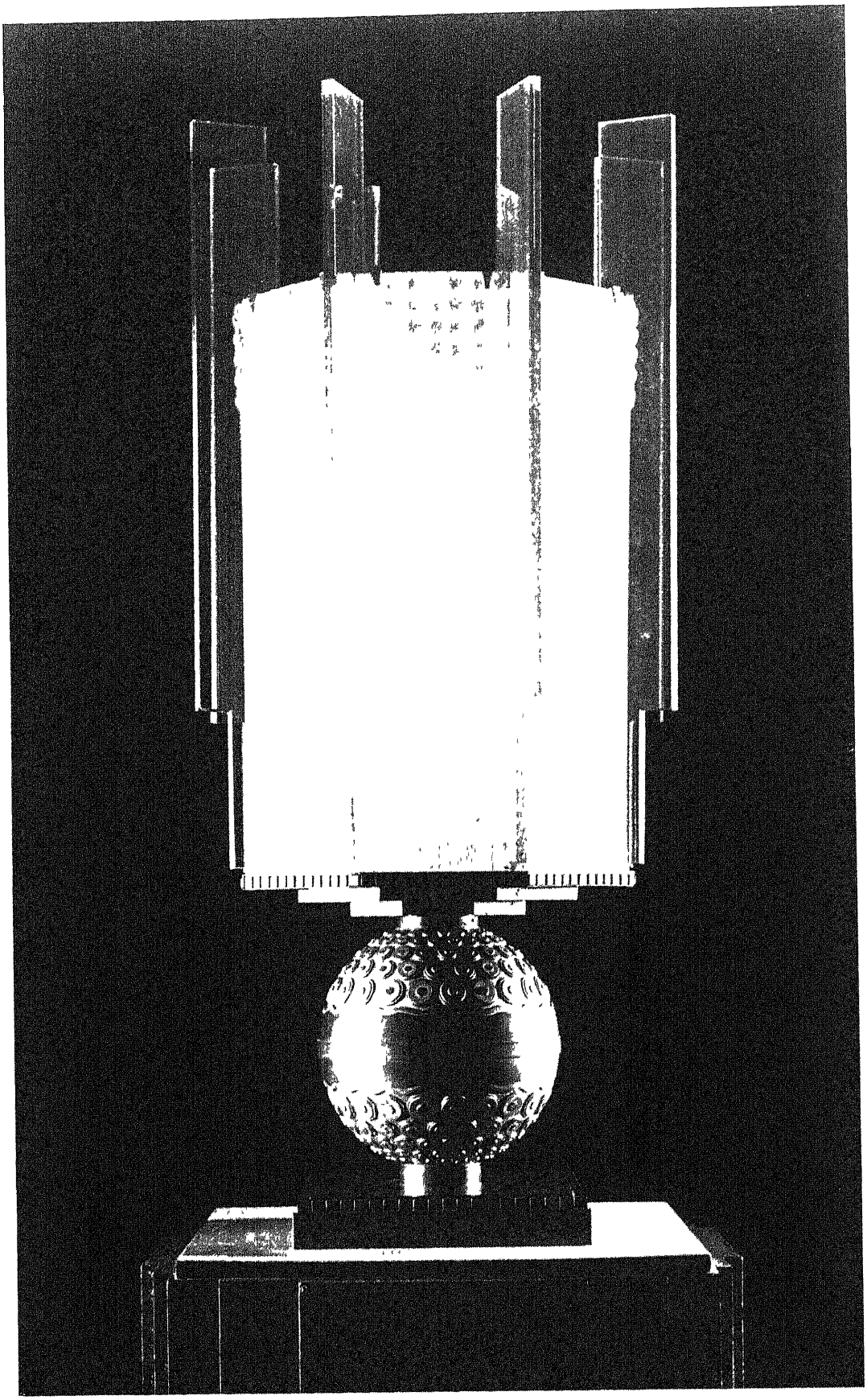


VENINI, S A , MURANO HANGING LUSTRE AND WALL SCONCE IN COLOURED BLOWN GLASS

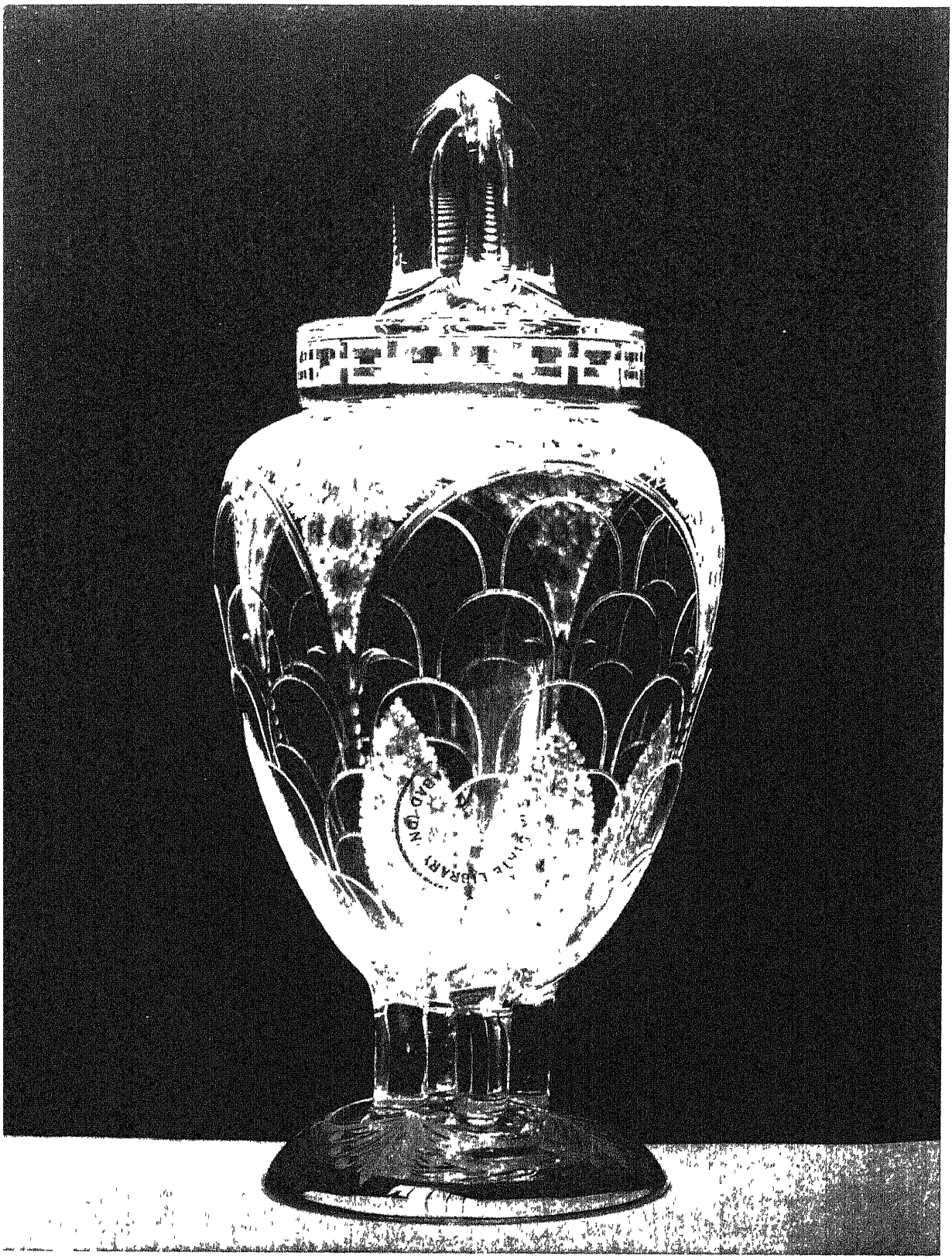


VENINI, S. A., MURANO. TABLE LAMPS WITH COLOURED GLASS ORNAMENTS ENCLOSED WITHIN THE VASES

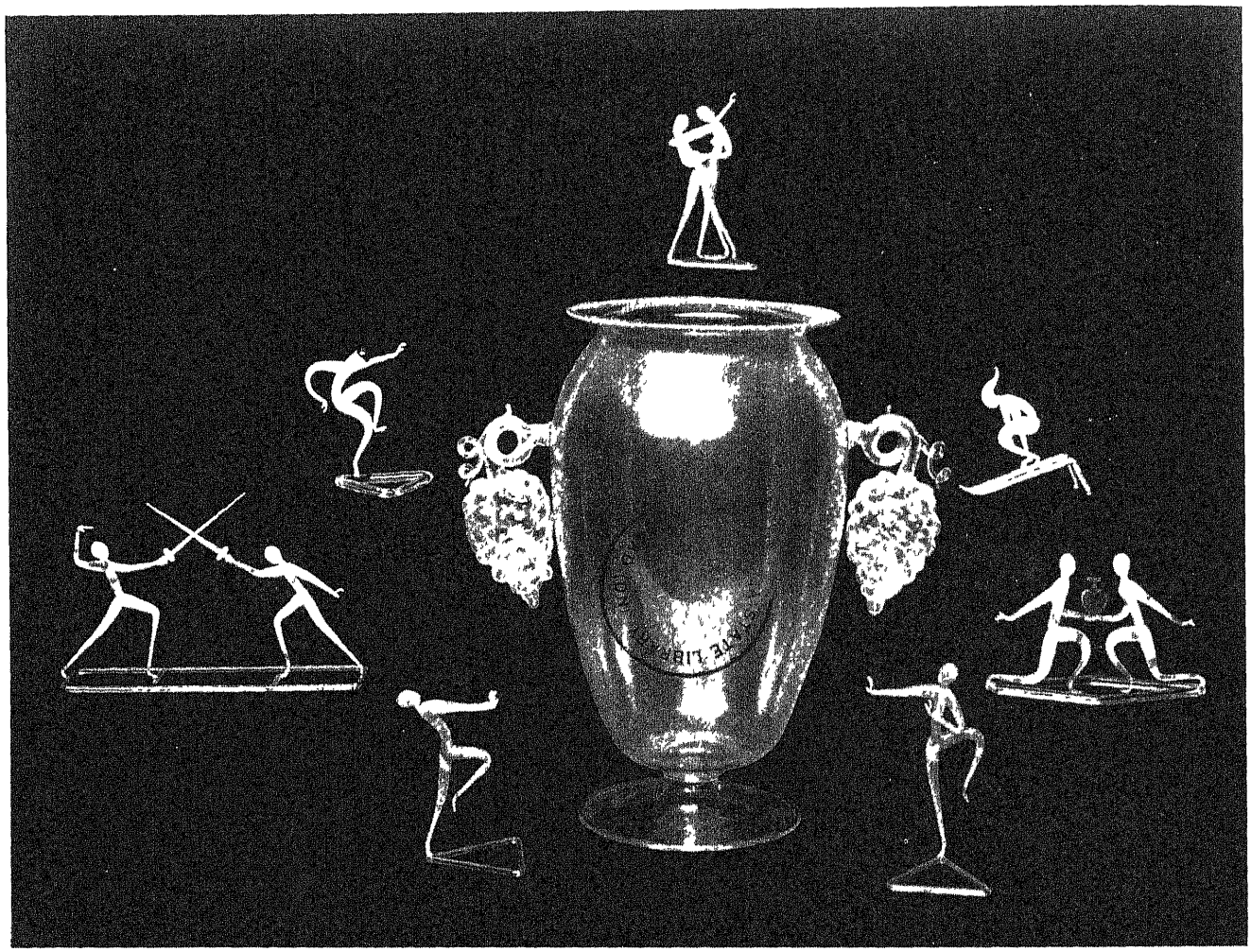




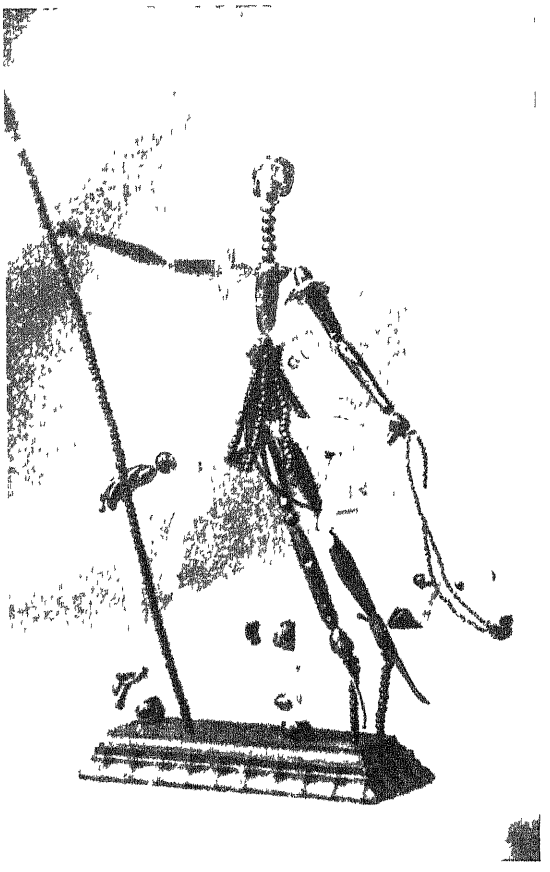
P. GENET & L. MICHON, PARIS: TABLE LAMP WITH PRESSED GLASS PANELS SURMOUNTING A CARVED BRONZE BASE

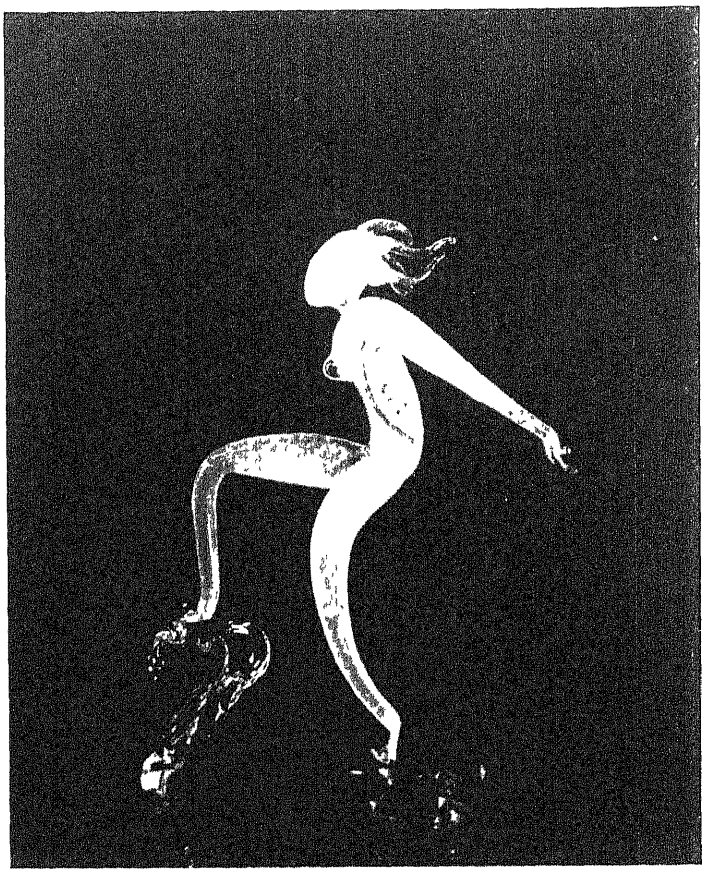


STEUBEN GLASS WORKS, CORNING, NEW YORK DECORATIVE URN IN ENGRAVED CRYSTAL

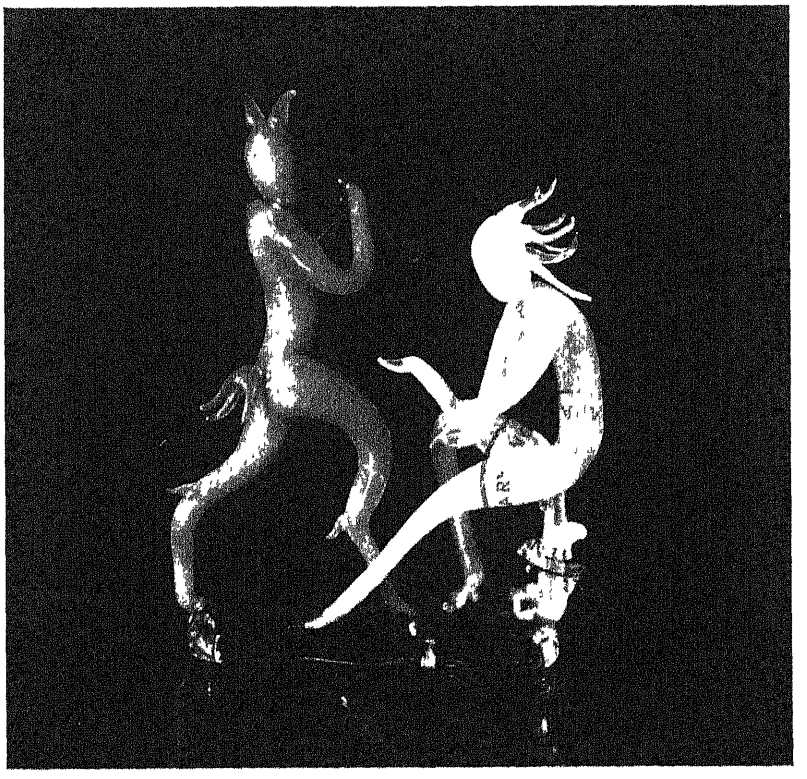


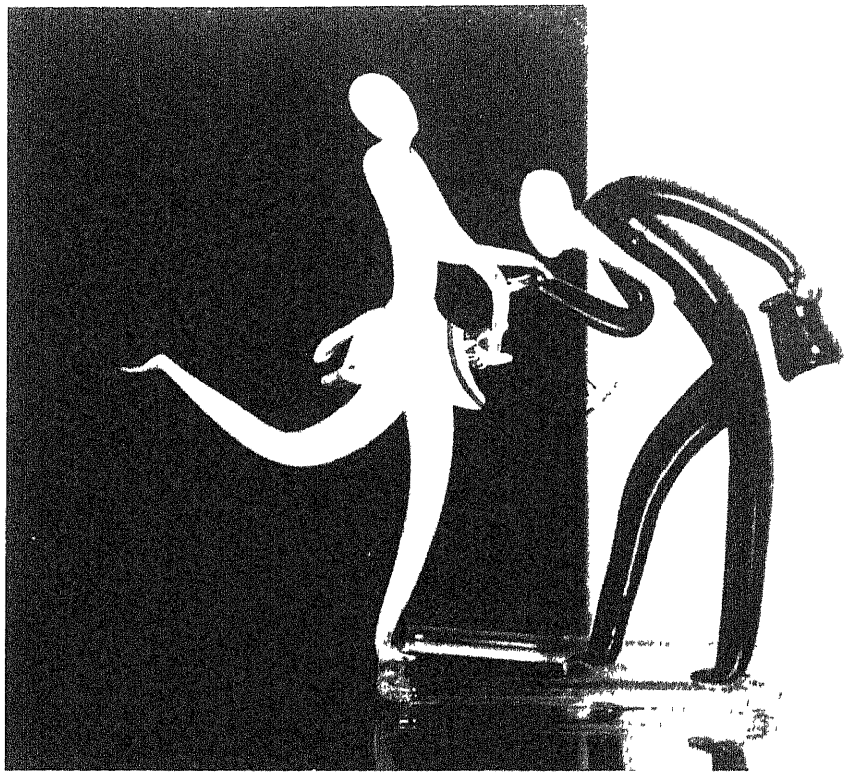
BIMINI WERKSTATTEN, VIENNA BLOWN GLASS FIGURINES AND VASE, DESIGNED BY A AND J BERGER AND FRITZ LAMPL





ABIONIC TECHNICAL SCHOOL FIGURINE "DON QUIXOTE" OF WIRED GLASS BEADS (ON LEFT) JAROSLAV BRYCHTA, ZLIZNY BROD TECHNICAL SCHOOL BLOWN GLASS FIGURINES (ON RIGHT AND BELOW)

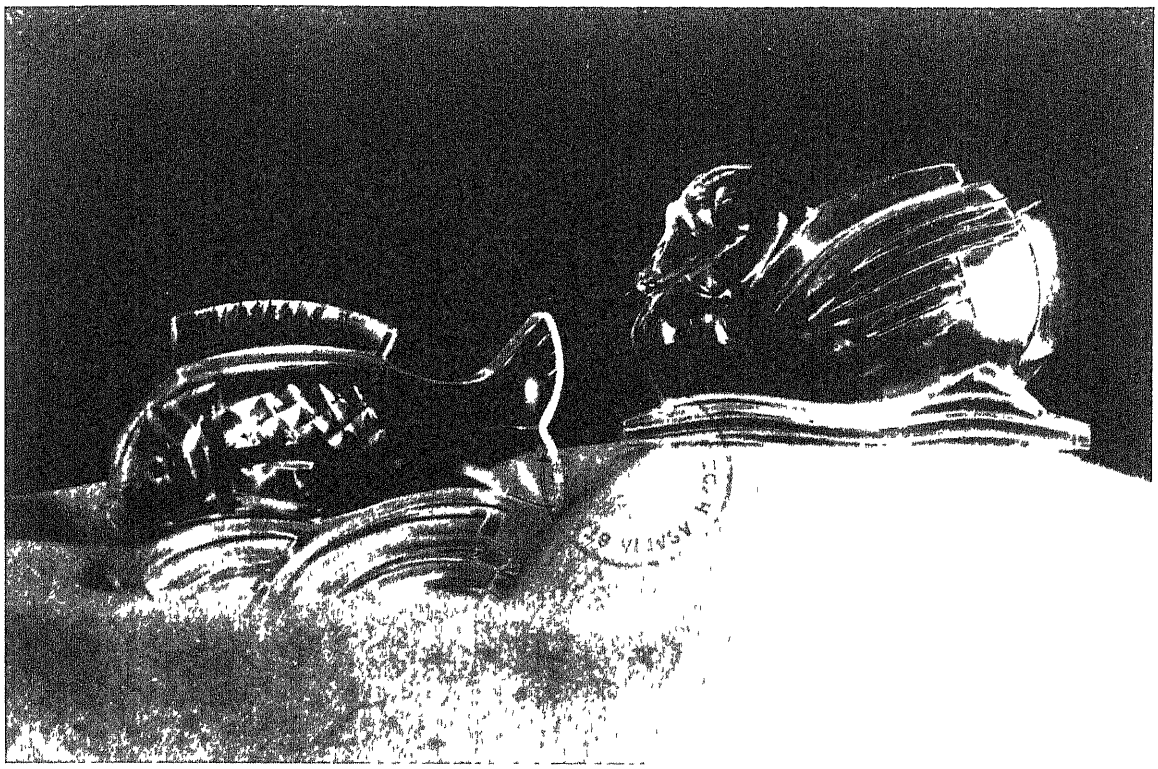




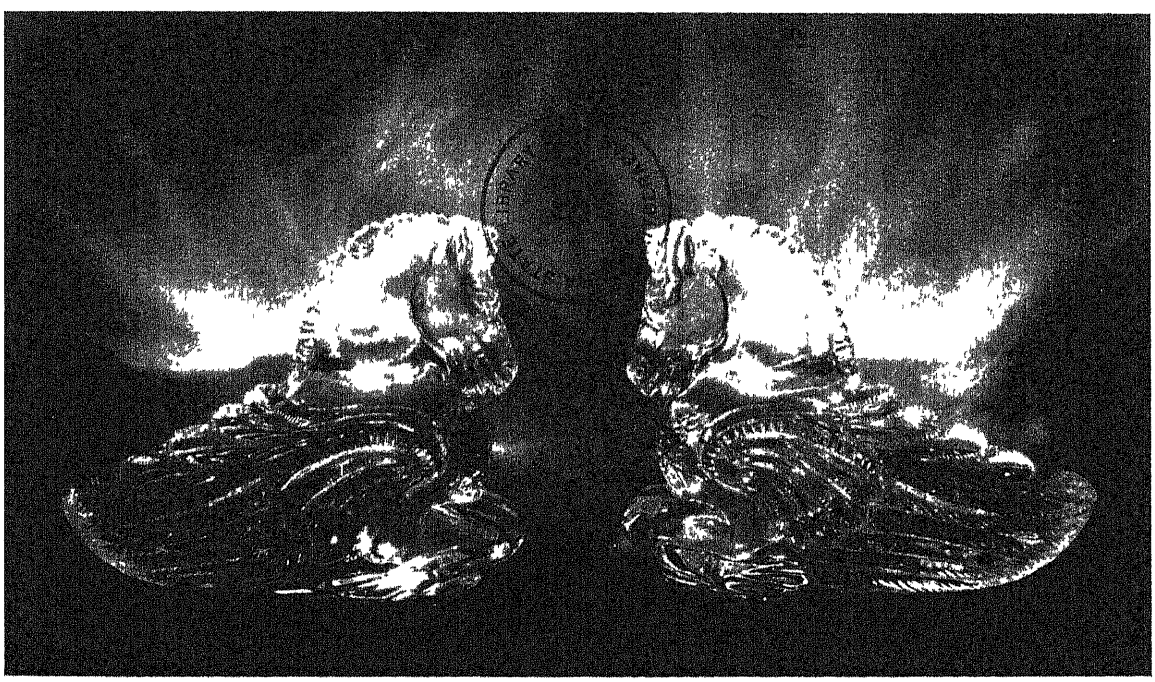
JAROSLAV BRYCHTA, ZELEZNY BROD TECHNICAL SCHOOL BLOWN GLASS FIGURINES

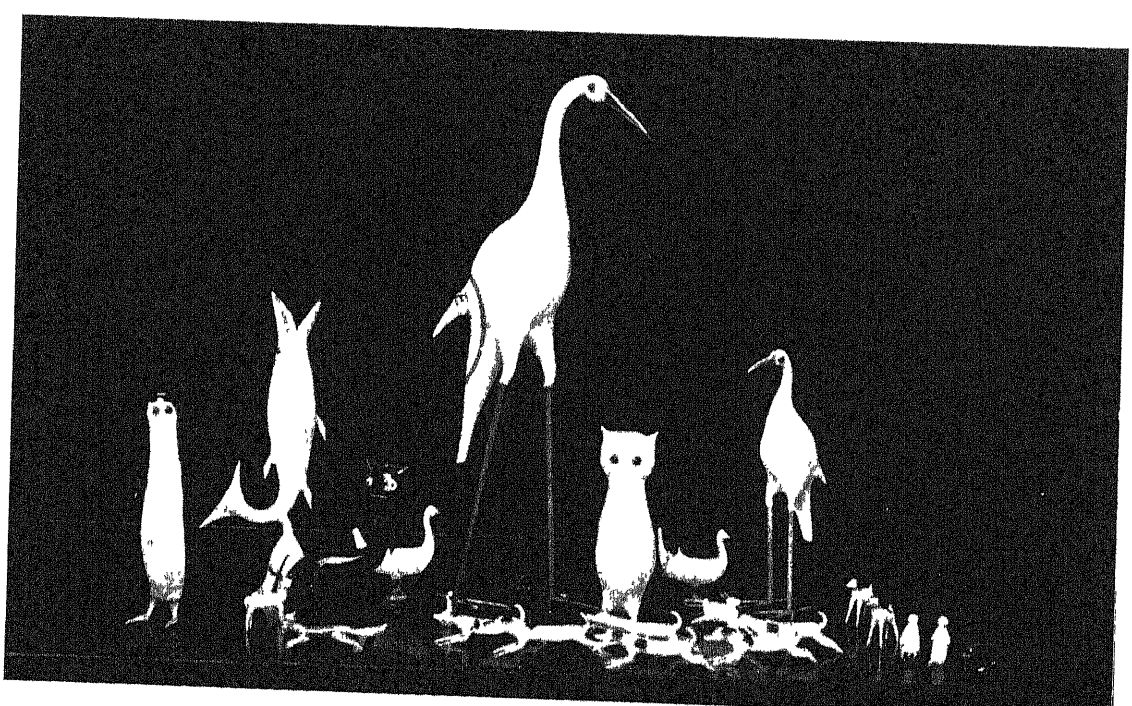
LÉON ZACK (ATELIER PRIMAVERA), PARIS DRAWN GLASS FIGURINES FOR TABLE DECORATION

BAROVIER, MURANO
FIGURES IN "PRIMAVERA" GLASSWARE WITH APPLIED COLOURED DECORATION

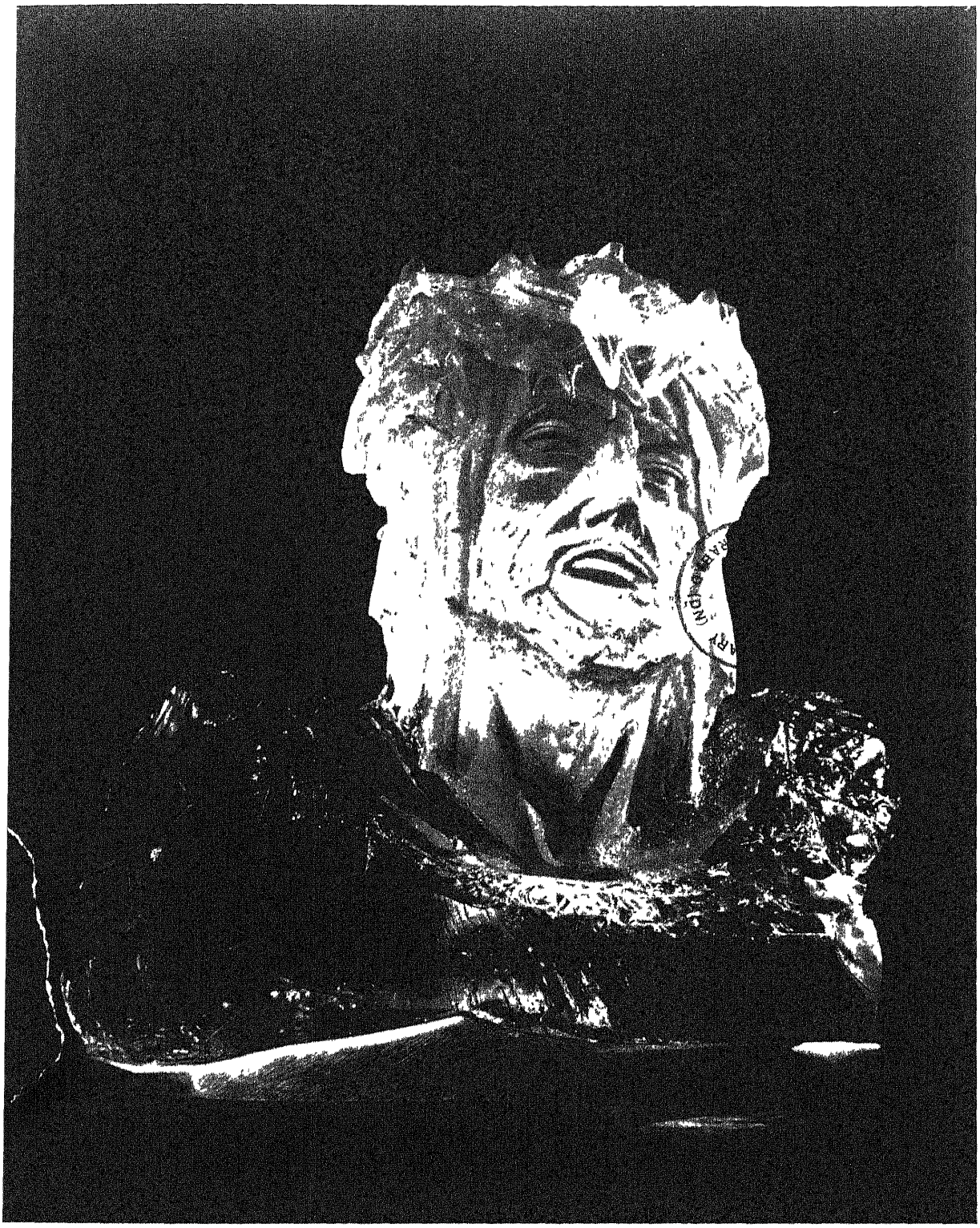


STEUBEN GLASS WORKS, CORNING, NEW YORK FISH ORNAMENTS IN POLISHED CRYSTAL (ABOVE) JABLONEC TECHNICAL SCHOOL CUT GLASS ORNAMENTS (BELOW)

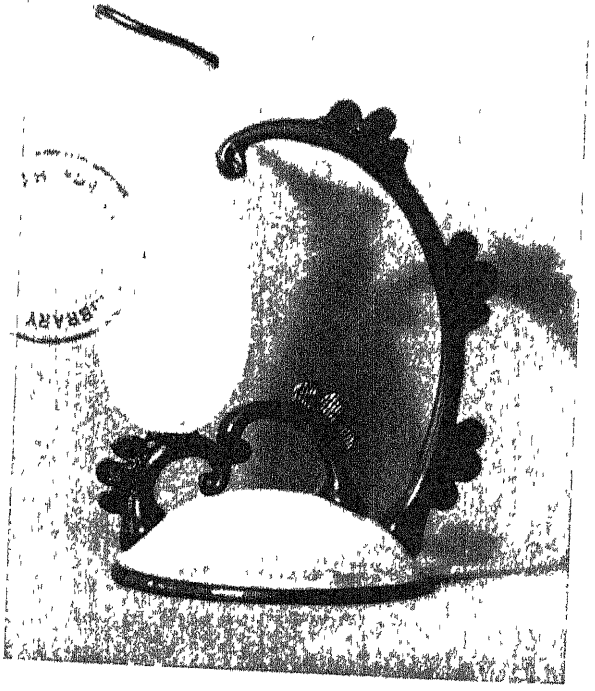


F. I. GREINER, BERLIN: BLOWN GLASS PARROTS (ABOVE). J. J. WALSH, LTD., BIRMINGHAM: GROUP OF BLOWN GLASS FIGURINES



ARISTIDE COLOTTI · HEAD OF CHRIST, CARVED FROM A SOLID BLOCK OF CRYSTAL



BAROVIER, MURANO: ORNAMENTAL "PRIMAVERA" GLASSWARE, WITH CONTRASTING DECORATION

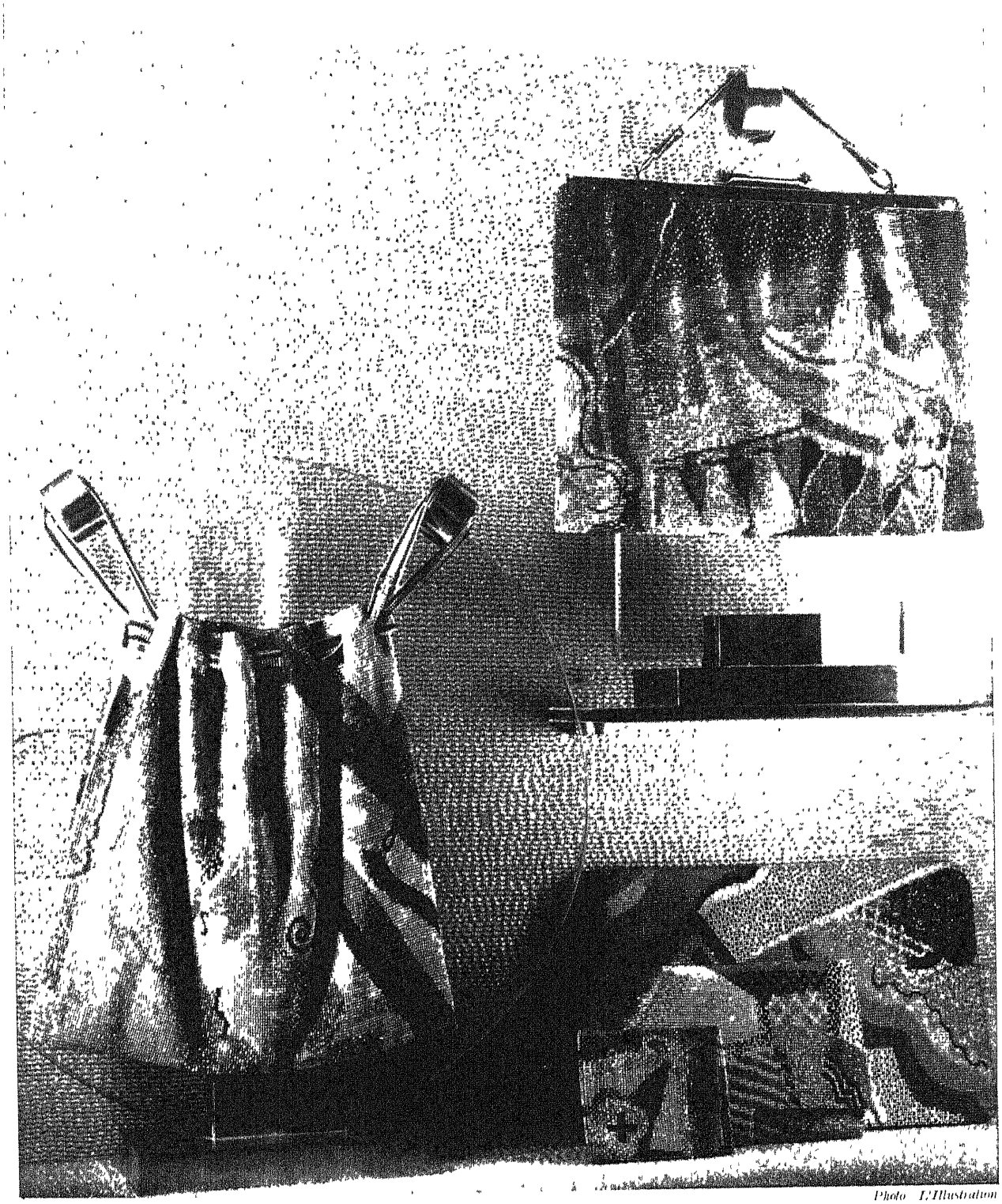
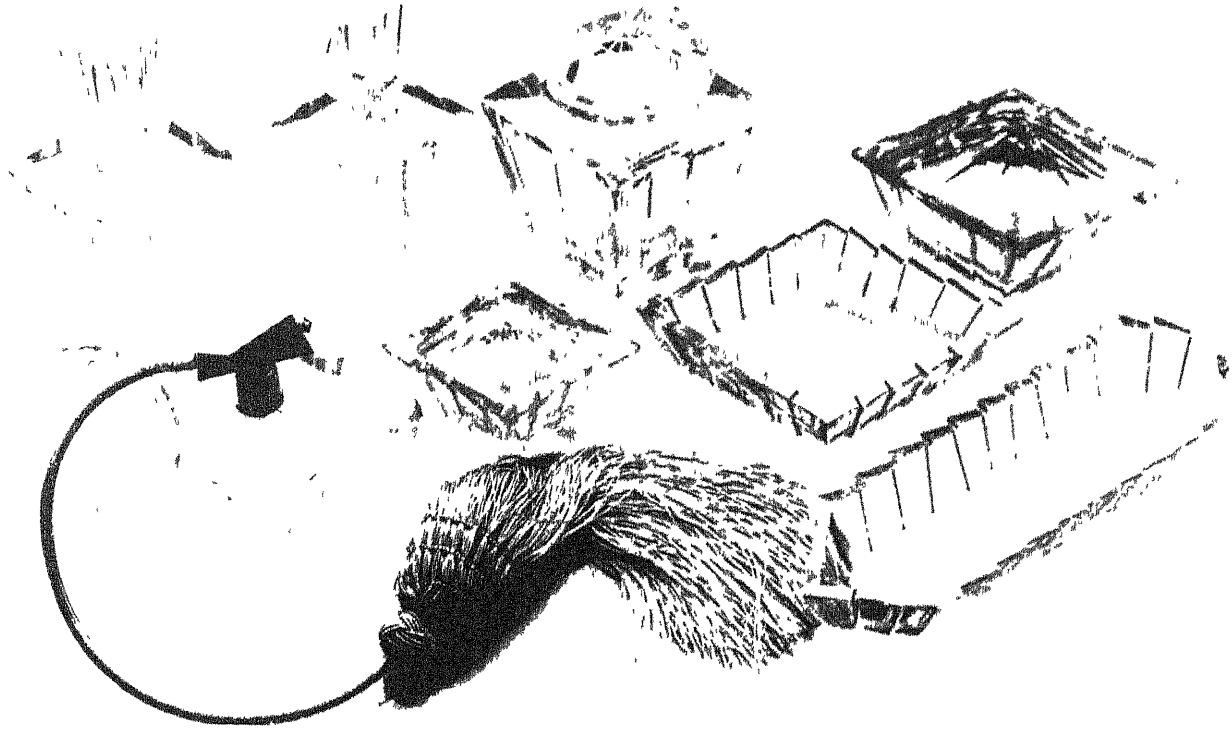
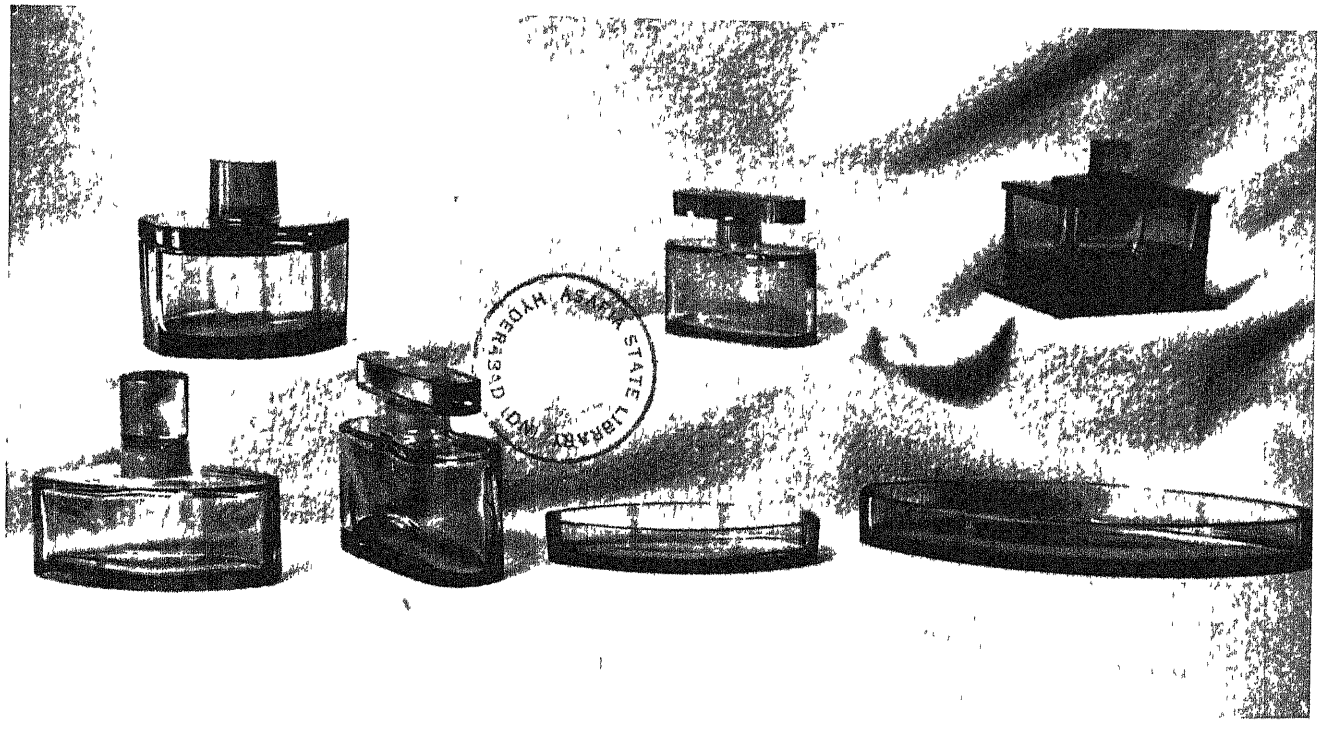


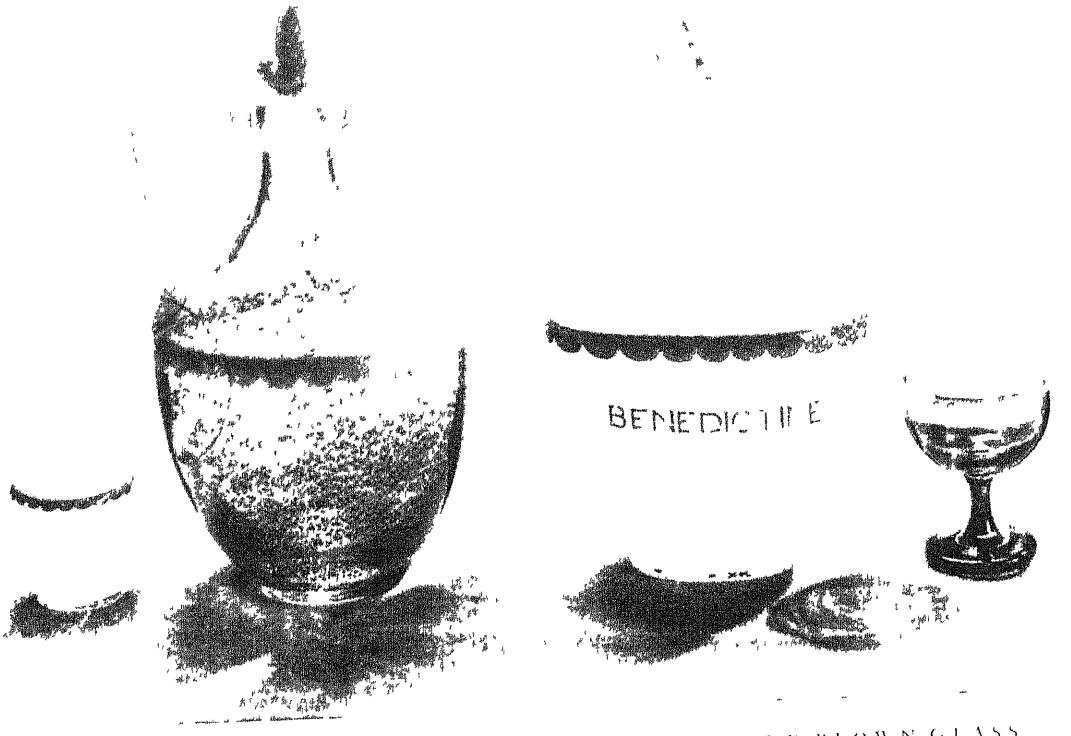
*Photo L'Illustration*

ATELIER PRIMAVERA, PARIS HANDBAGS AND POCHETTES IN COLOURED GLASS BEADWORK

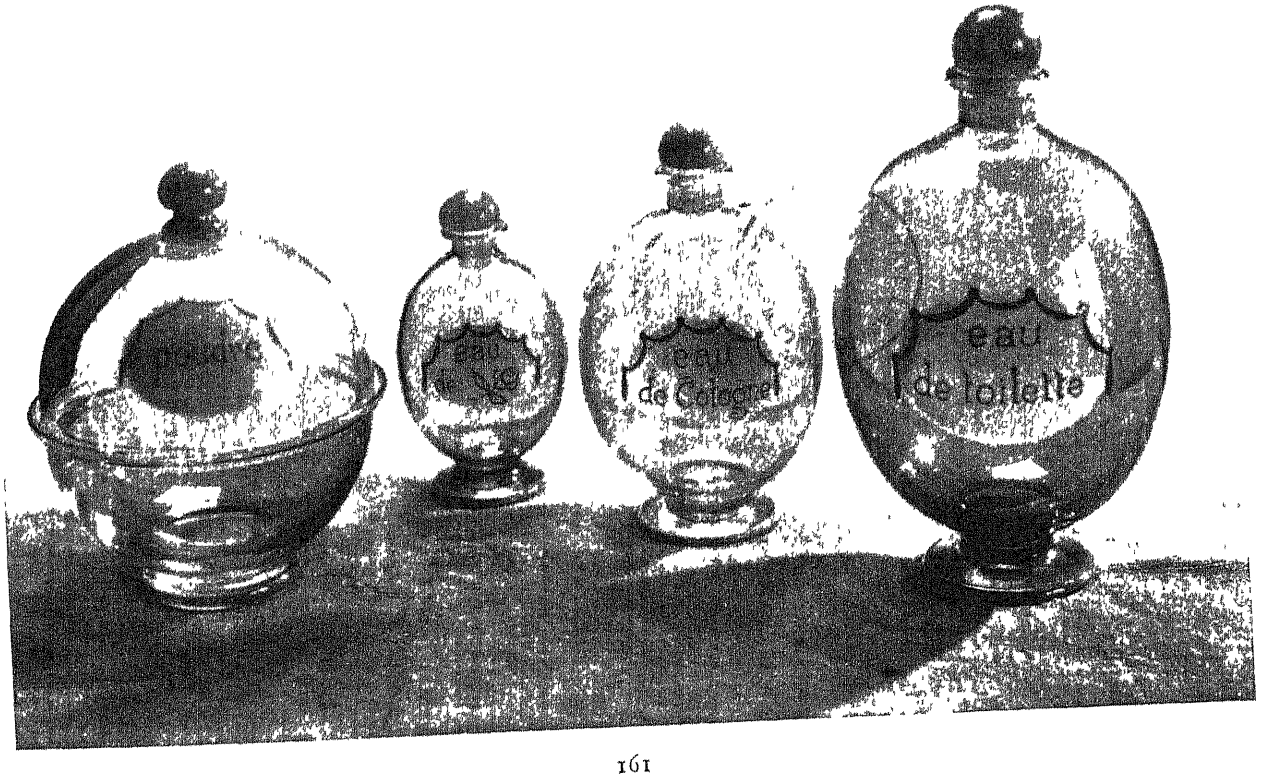


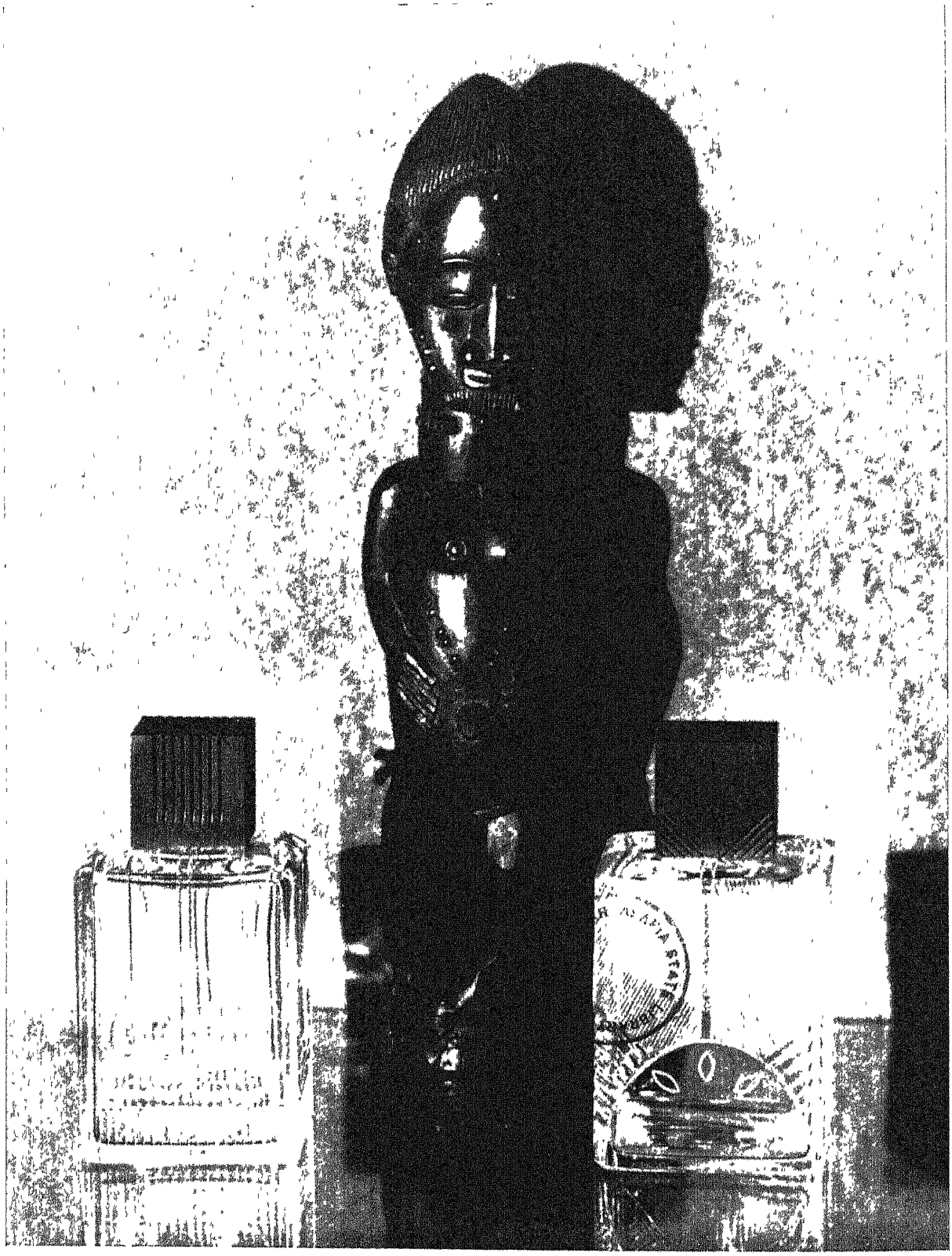
MOSER CRYSTAL GLASS WORKS, CZECHOSLOVAKIA TOILET SET OF HEAVY CUT CRYSTAL (ABOVE) JOSEF GERNER, BOR BOHEMIA TOILET SET OF MOLDED GLASS



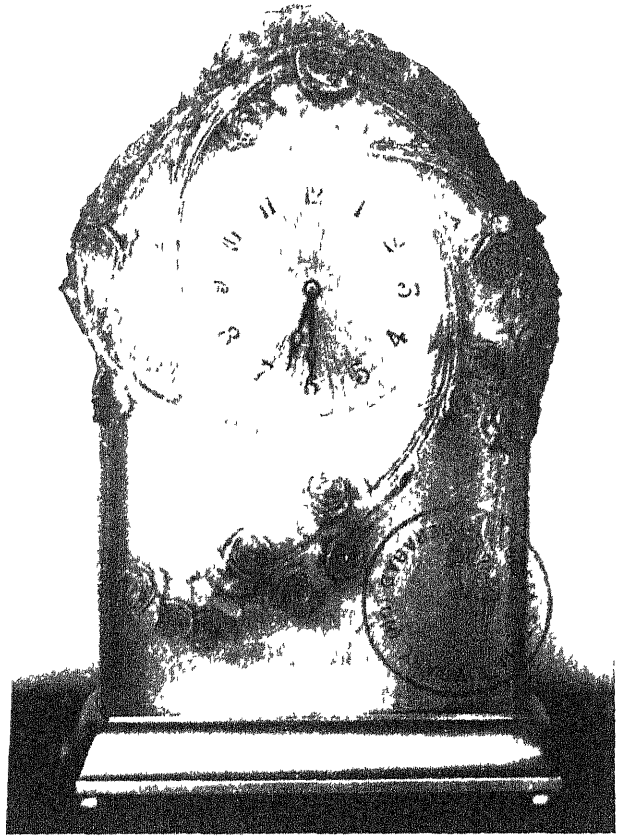



ANDRE GROULT BOTTLES AND FLASKS IN COLOURED BLOWN GLASS



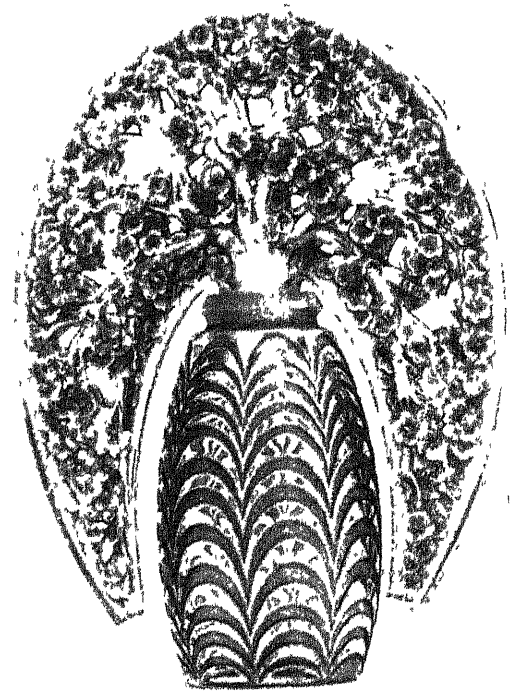


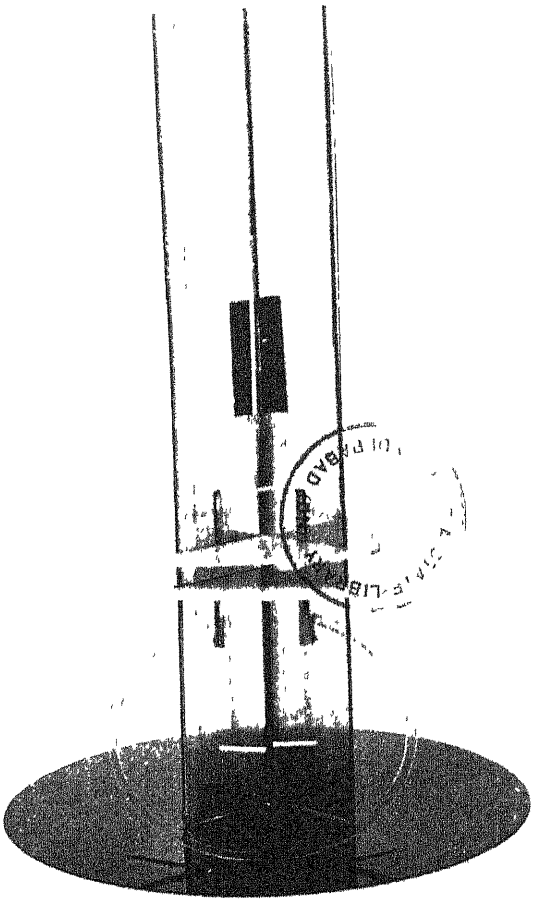
LOUIS VUITTON, PARIS SCENT BOTTLES IN CUT CRYSTAL DESIGNS INSPIRED BY NEGRO ART



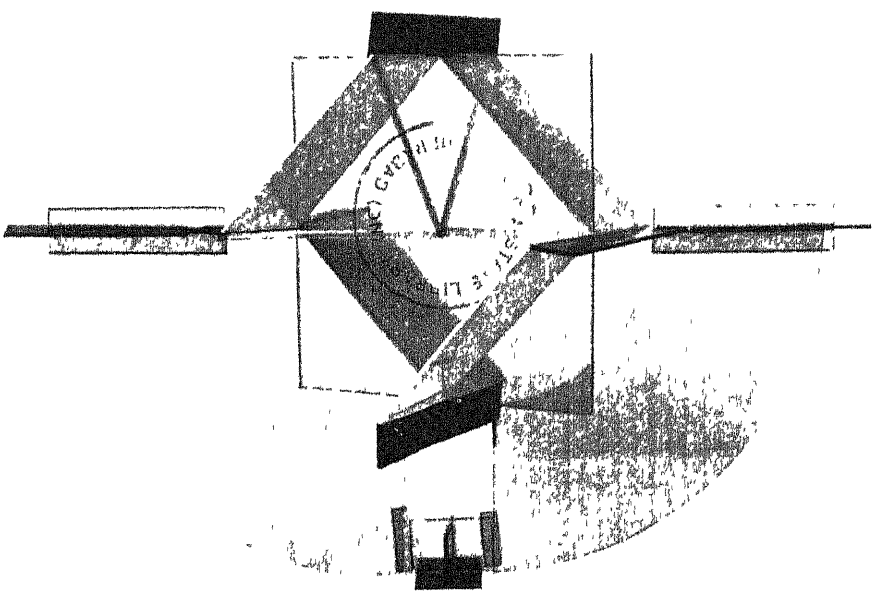
RENÉ LALIQUE, PARIS. CLOCK ENGRAVED IN MOULDED GLASS ("CIRE PERDUE" PROCESS) FOR H.M. THE QUEEN OF EGYPT

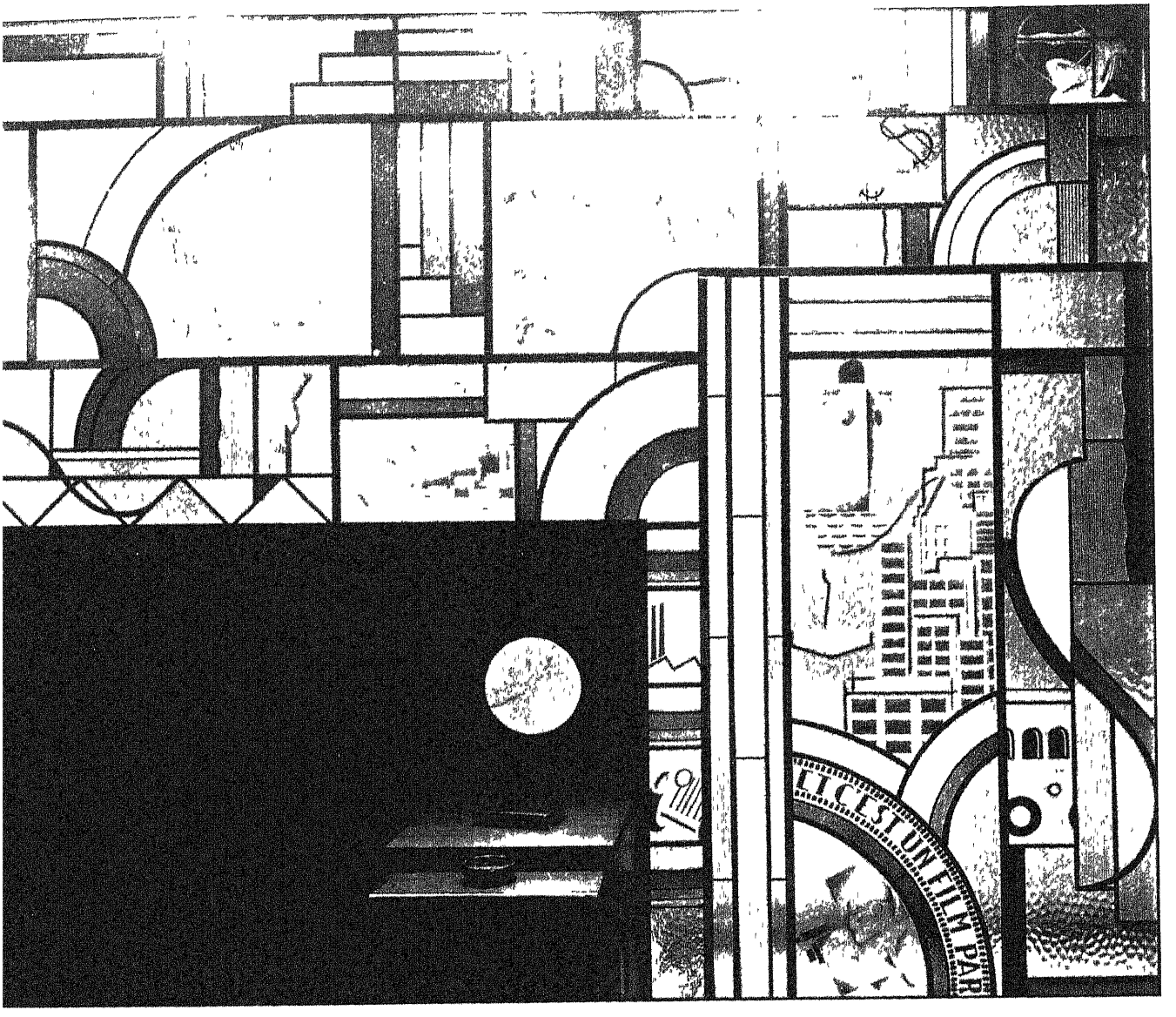
RENÉ LALIQUE, PARIS. TABLE DECORATION IN MOULDED GLASS





GABO, BERLIN
"ABSTRACT"
ORNAMENTS IN
GLASS AND METAL





RAY & CHANSON, PARIS STAINED GLASS WINDOW MADE FROM INDUSTRIALLY PRODUCED GLASS

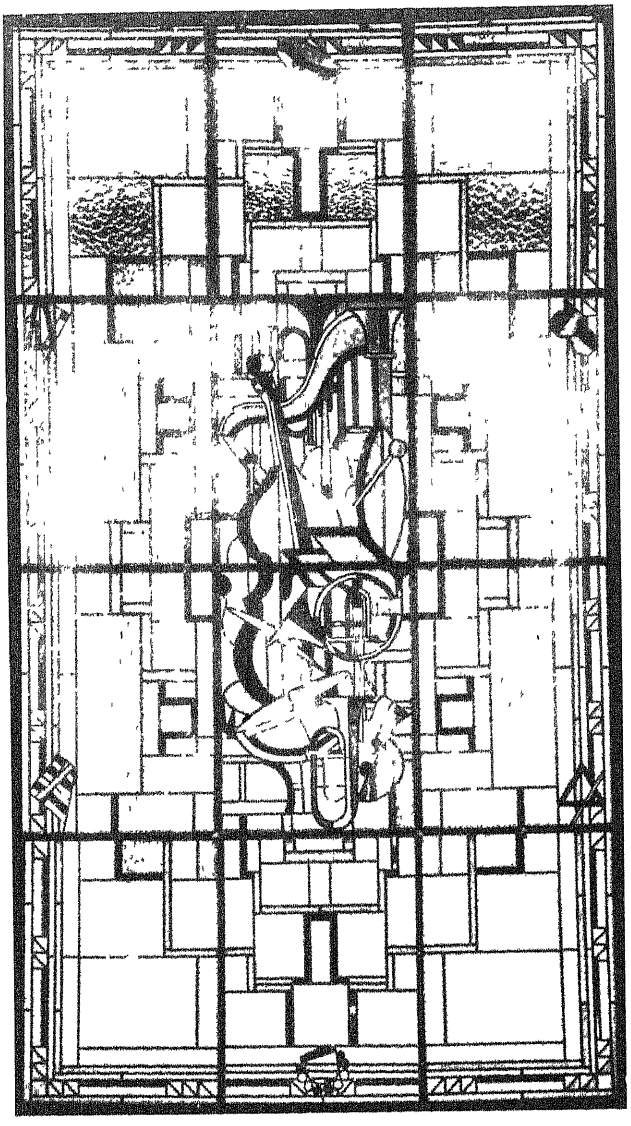
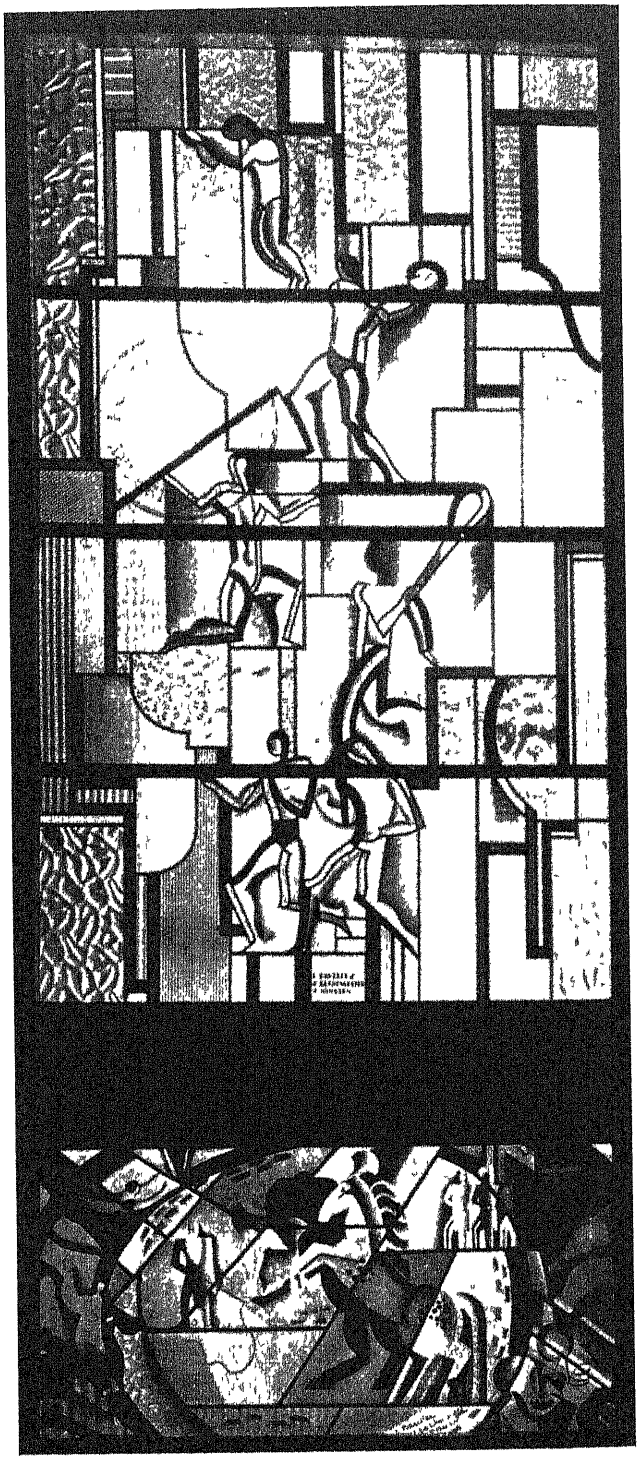
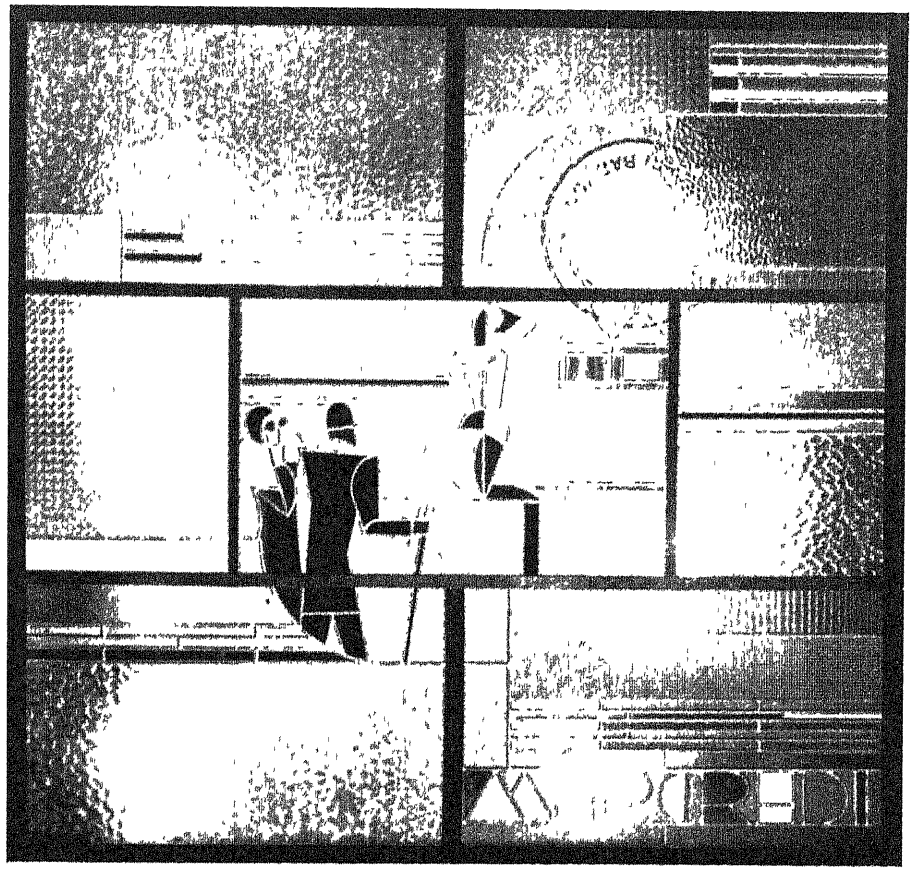


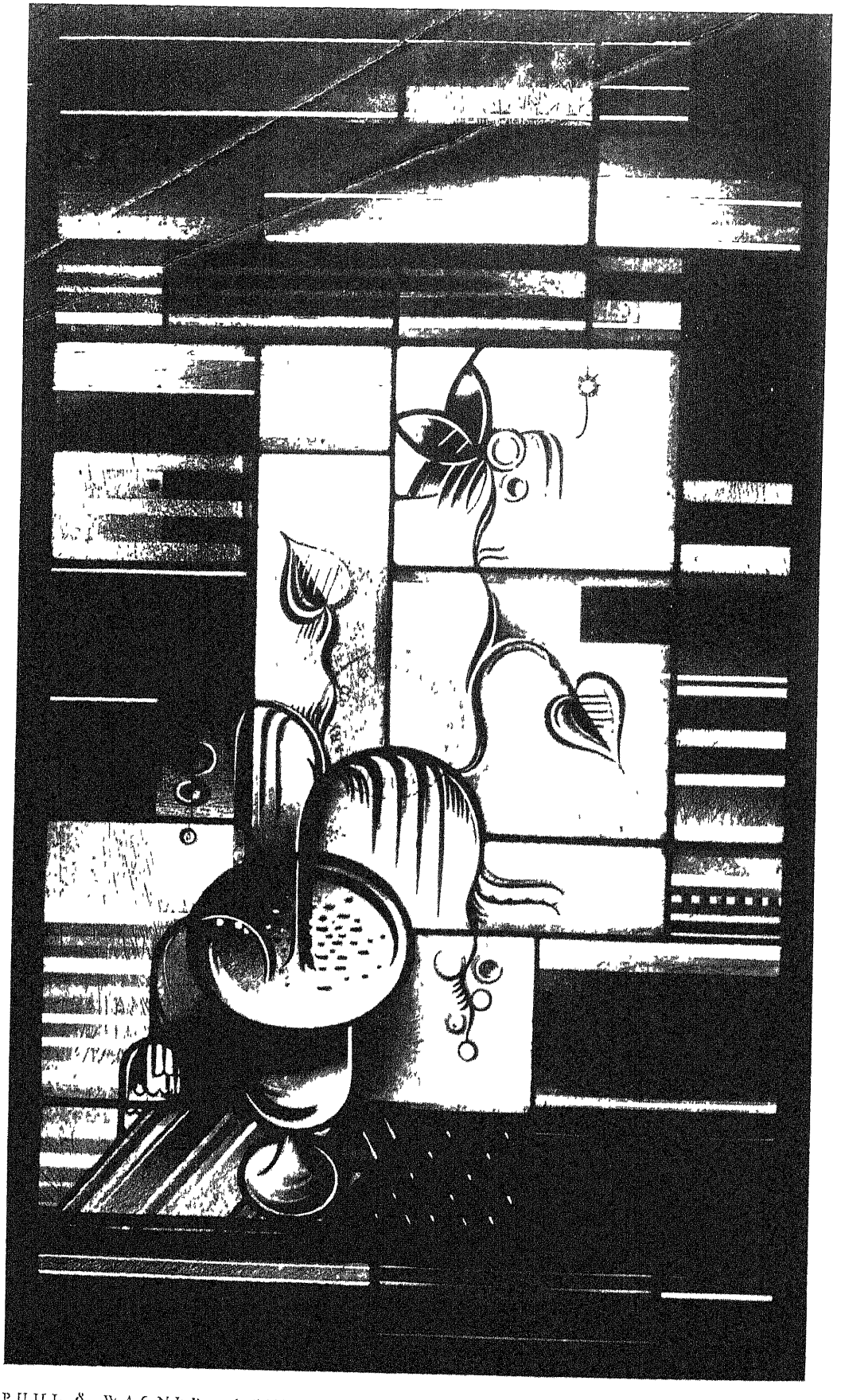
*Photo Illustration*



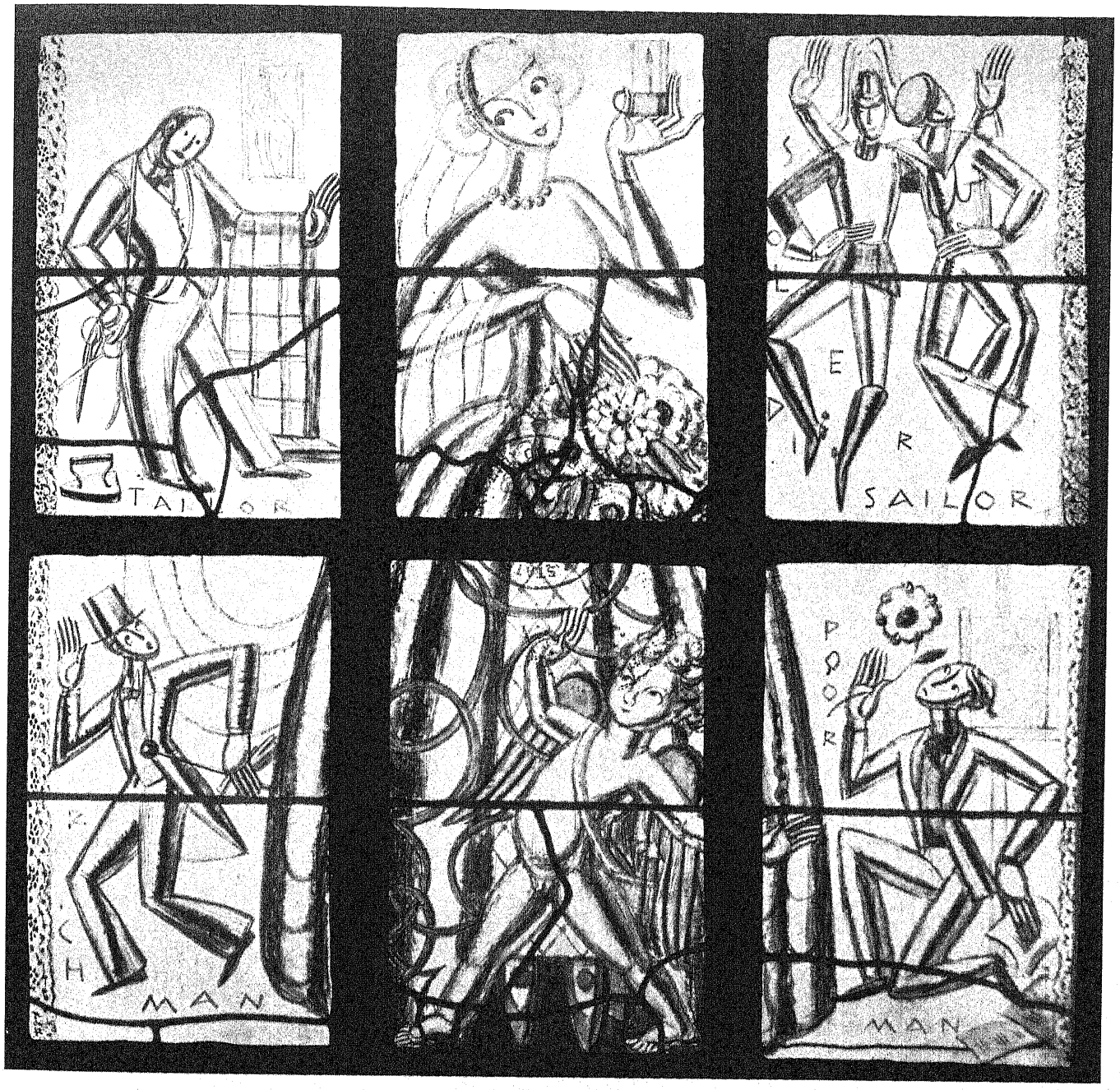
LOUIS BARILLET WINDOWS FOR A PRIVATE HOUSE IN INAMELLED AND MANUFACTURED GLASS

OUIS BARILLET, PARIS WINDOW FOR A PRIVATE HOUSE, "STILL LIFE" (ABOVE)
ART OF A WINDOW AT "LA SEMAINE À PARIS" OFFICES IN PARIS (BELOW) BOTH
EXECUTED IN A COMBINATION OF ENAMELLED AND MANUFACTURED GLASS

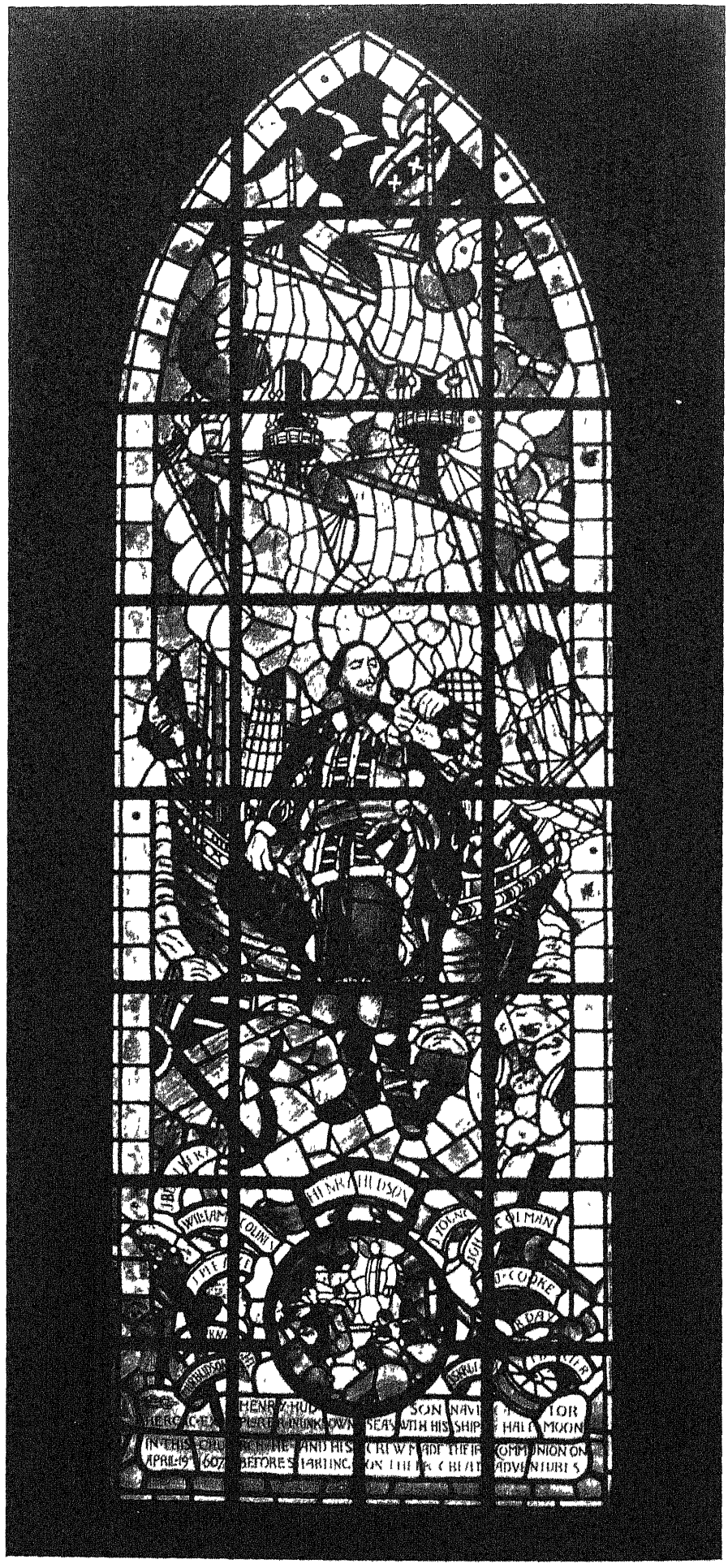




PUHL & WAGNER—GOTTFRIED HEINERSDORFF, BERLIN: LIBRARY WINDOW, DESIGNED BY A. GROLL



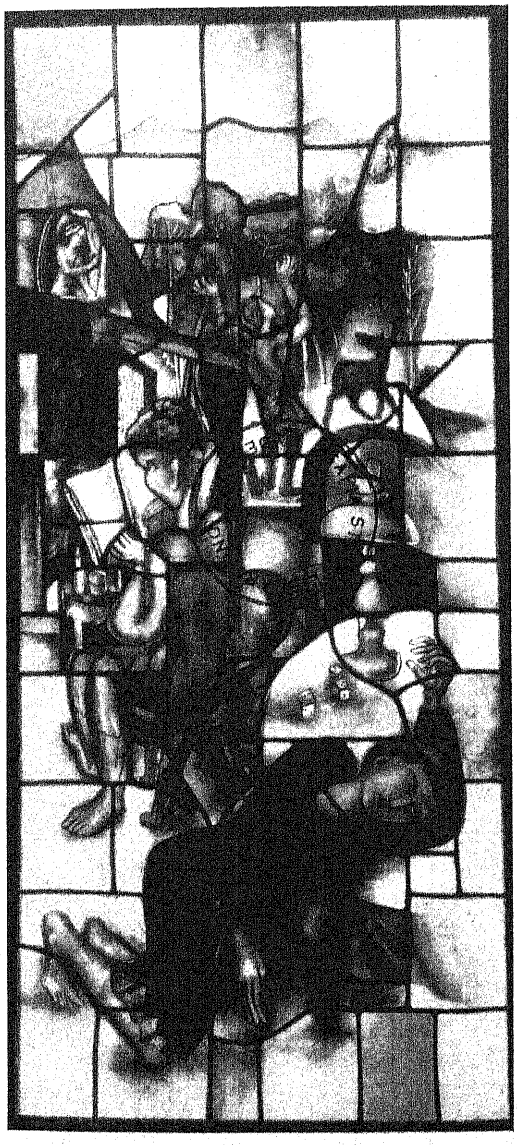

M. FORSYTH, LONDON: CARTOON FOR A STAINED GLASS WINDOW




LEONARD WALKER, LONDON HENRY HUDSON MEMORIAL WINDOW, ST ETHELBURGA'S CHURCH, BISHOPSGATE

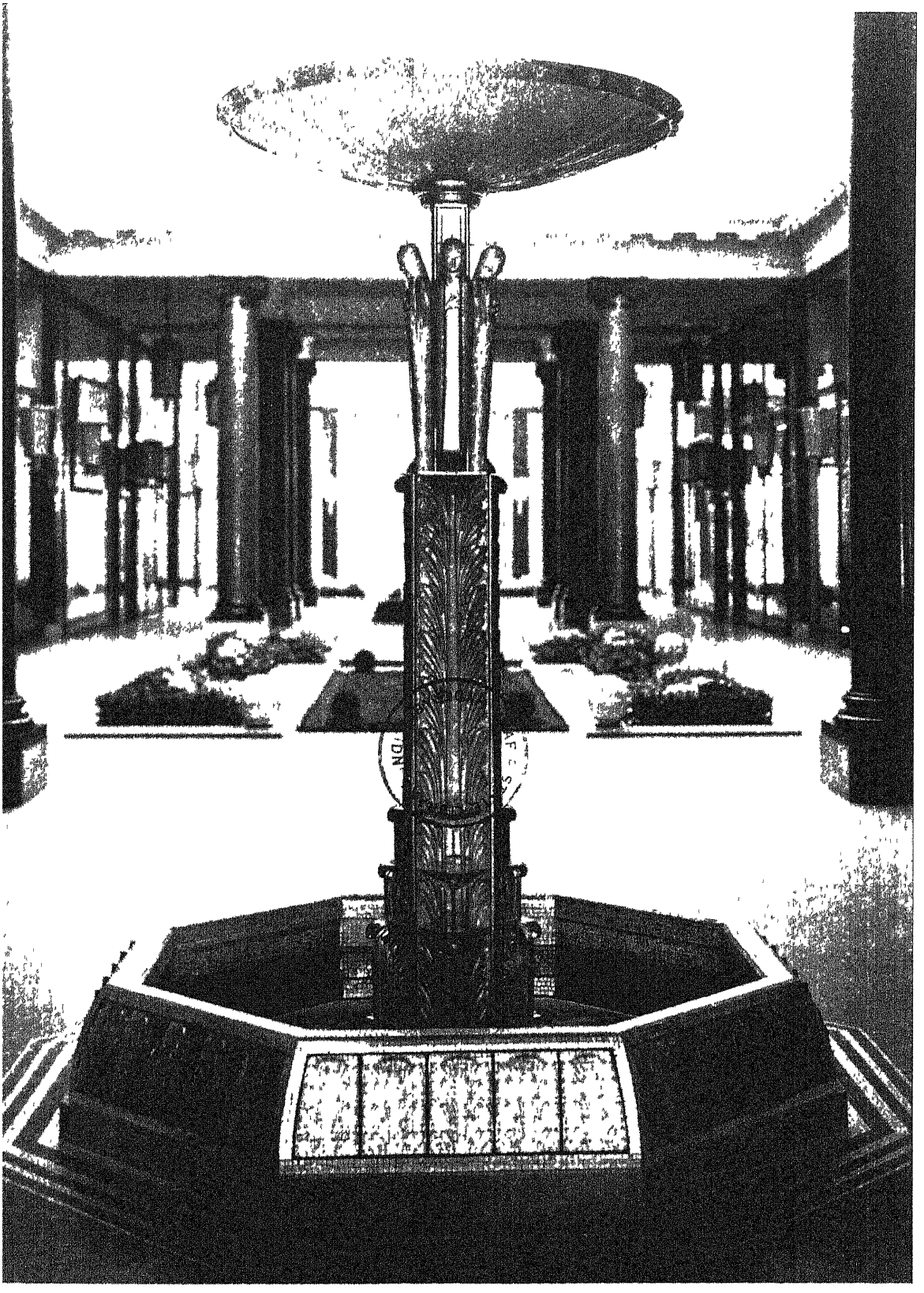
"EXPECTATION"

JOEP NICOLAS, ROERMOND: WINDOWS FOR A PRIVATE HOUSE



"SUMMER DREAM"

CAPPELLIN & CO., MURANO: ENAMELLED GLASS PANELS DESIGNED BY C. A. SCARPA



N. LALIQUE, PARIS: FOUNTAIN OF GLASS, THE BASIN IN GLASS MOSAIC

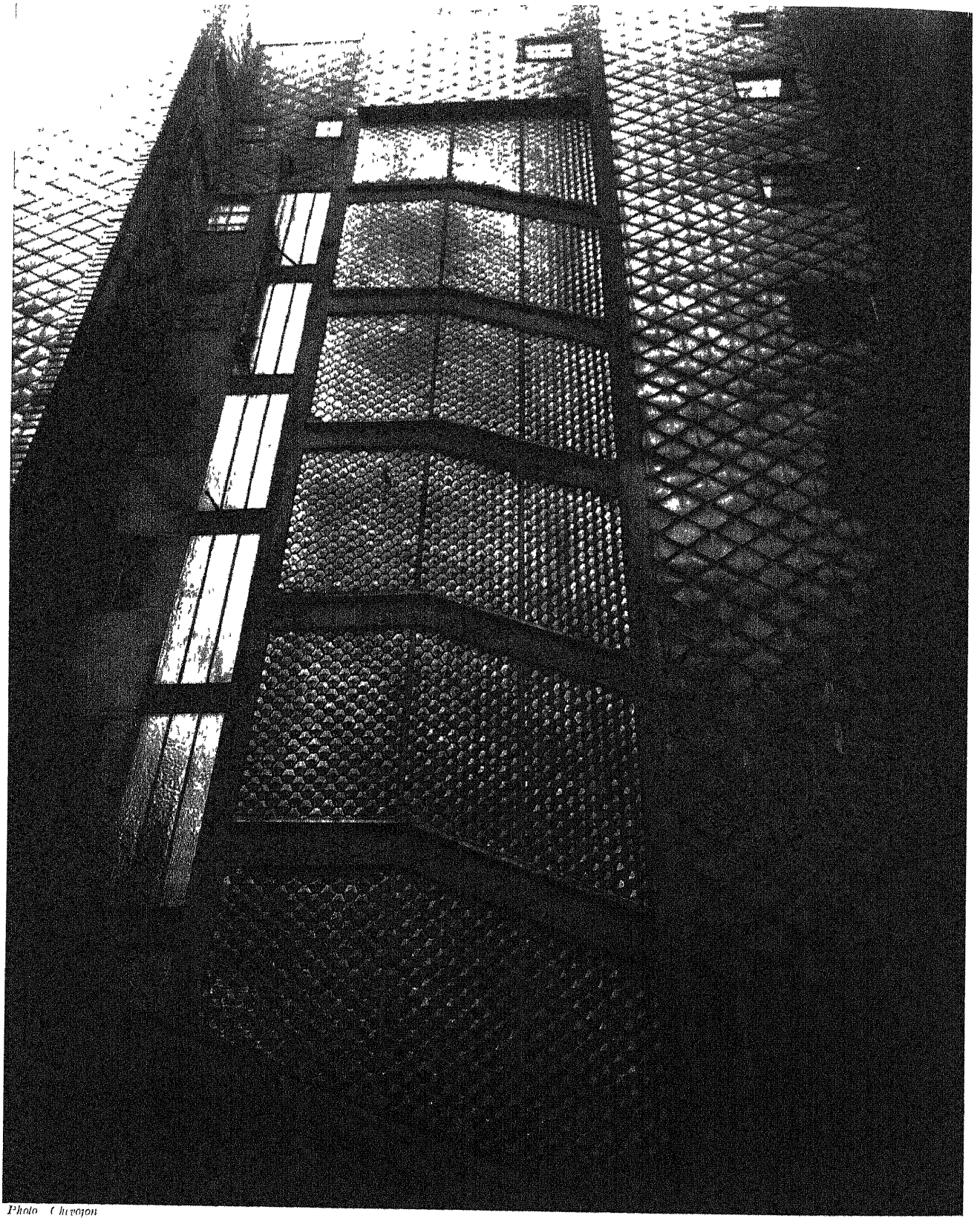
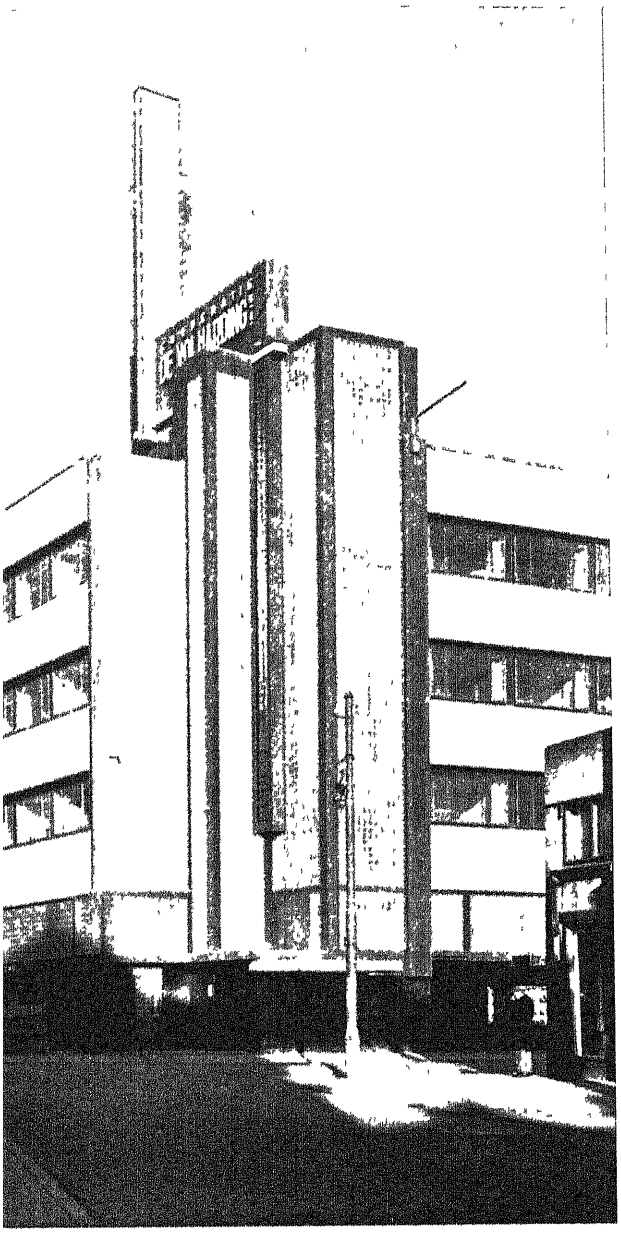


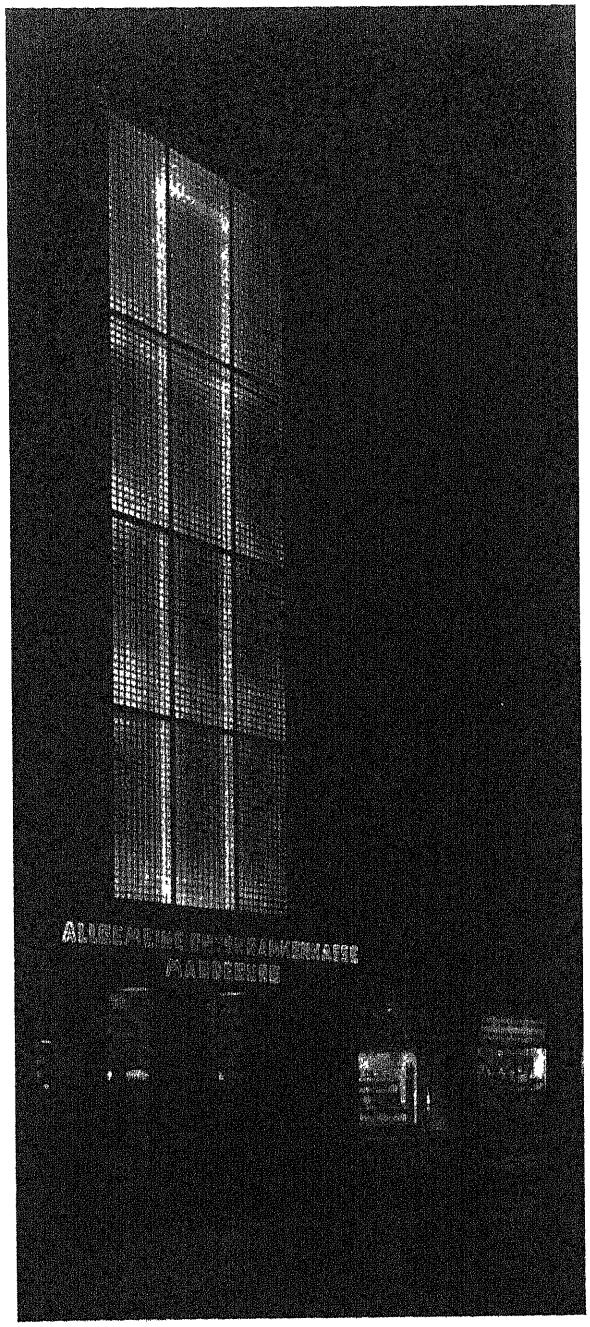
*Photo Chevojon*

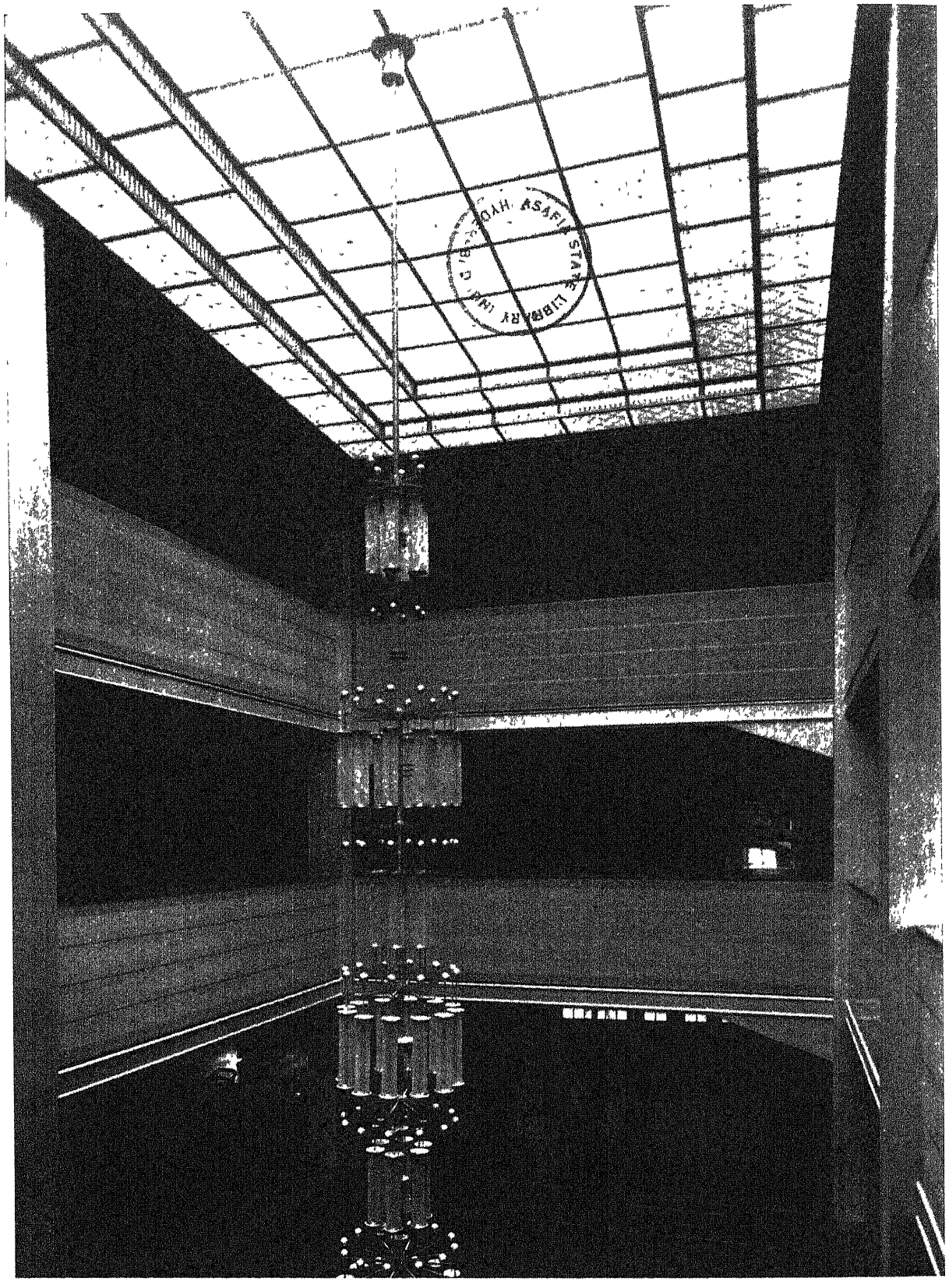
AUGUSTE PERRET, PARIS: WALL OF GLASS IN THE ARCHITECT'S HOUSE, RUE FRANKLIN



BUFFS, THE HAGUE A SHOP AT THE ...UE WITH WALLS CONSTRUCTED OF GLASS BRICKS

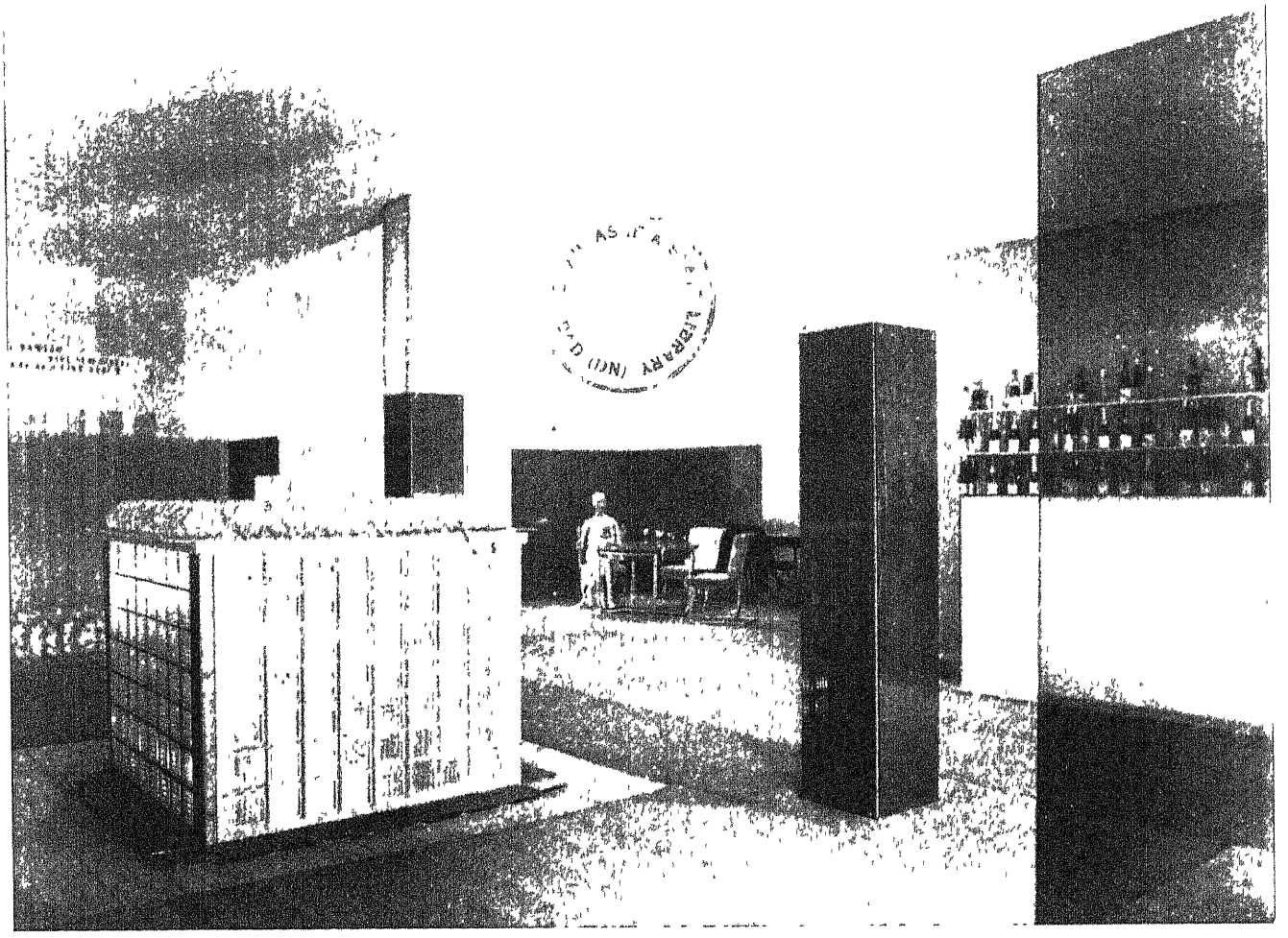
KARL CRAYL, MAGDEBURG STAIRCASE WALL CONSTRUCTED OF GLASS BRICKS, SHOWN AT NIGHT





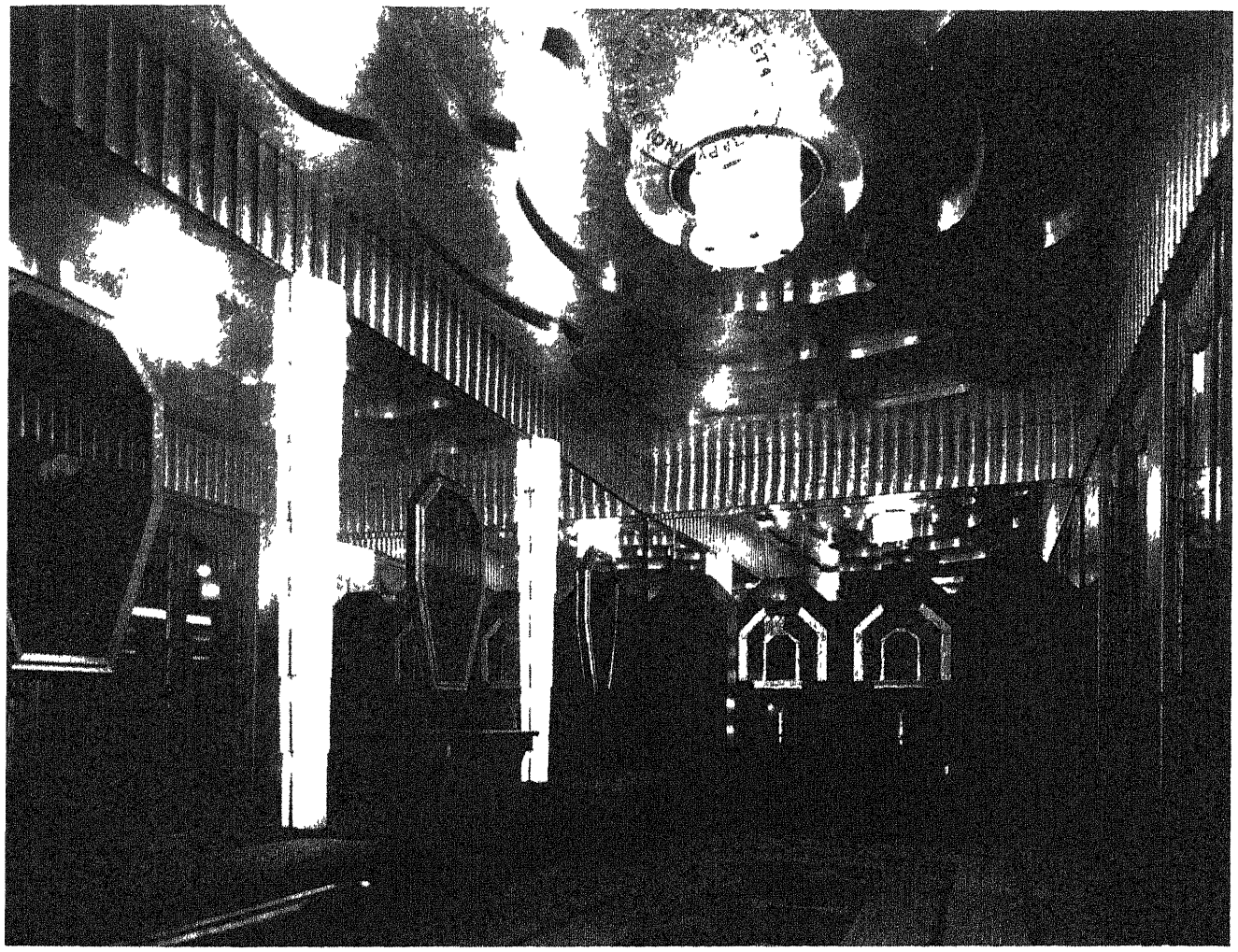

BAD KREUZNACH SWIMMING BATHS, ROOFED WITH "LUNELR" GLASS TILES

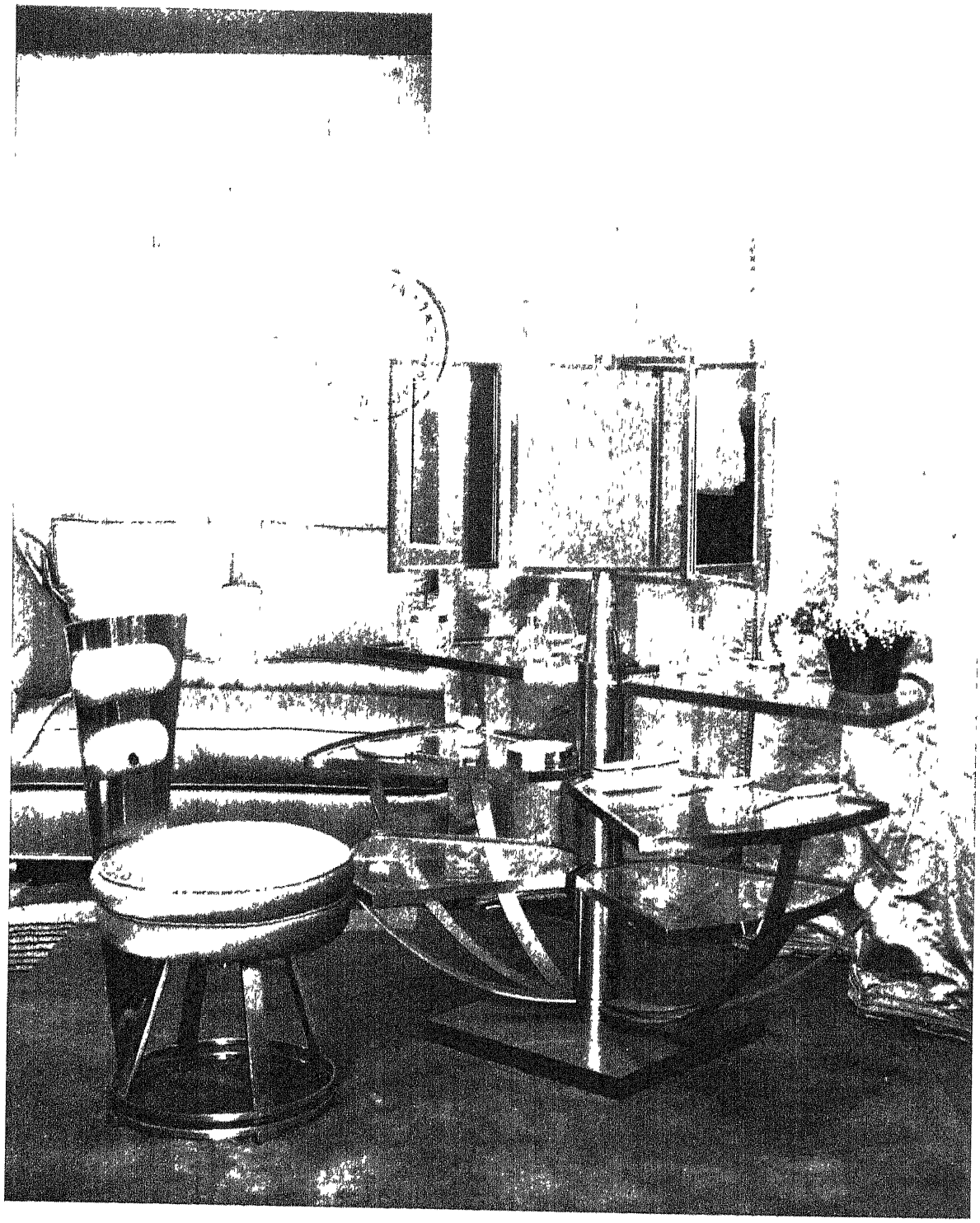
JAMES CLARK & SON, LTD., LONDON: BATHROOM WALLED IN PLAIN AND TINTED MIRROR GLASS



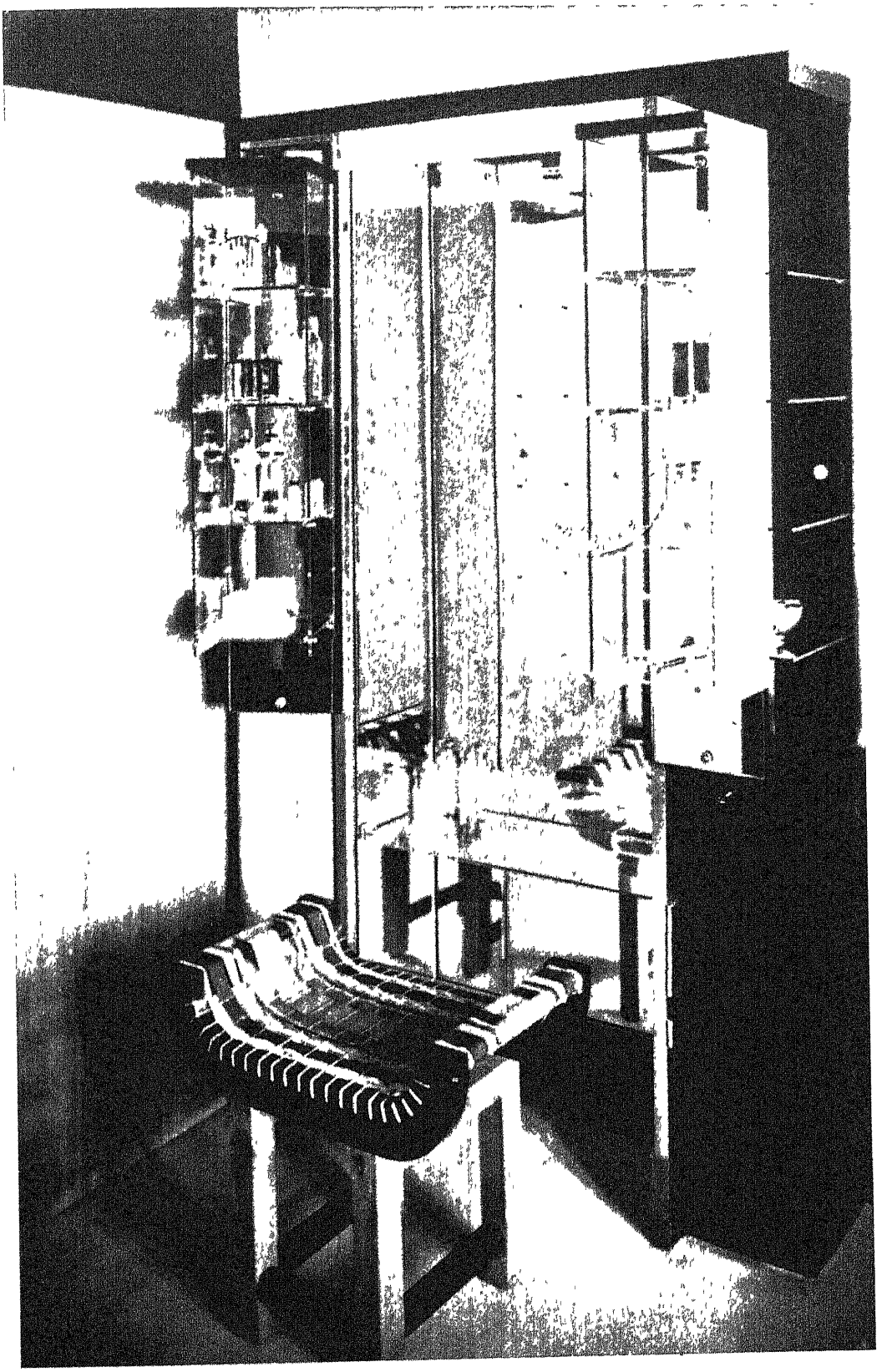
ANT. HEYTHUM, PRAGUE. TRANSPARENT GLASS PILLARS AND GLASS BRICKS FOR USE AS BUILDING MATERIAL SHOWN AT THE GLASS INDUSTRIES EXHIBITION AT ZELEZNY BROD

BASIL IONIDES, LONDON. FOYER OF THE SAVOY THEATRE. WALLS LINED WITH MIRROR, AND ELECTRIC LIGHT FITTINGS OF BLOWN GLASS, BY JAMES POWELL & SONS (WHITEFRIARS), LTD

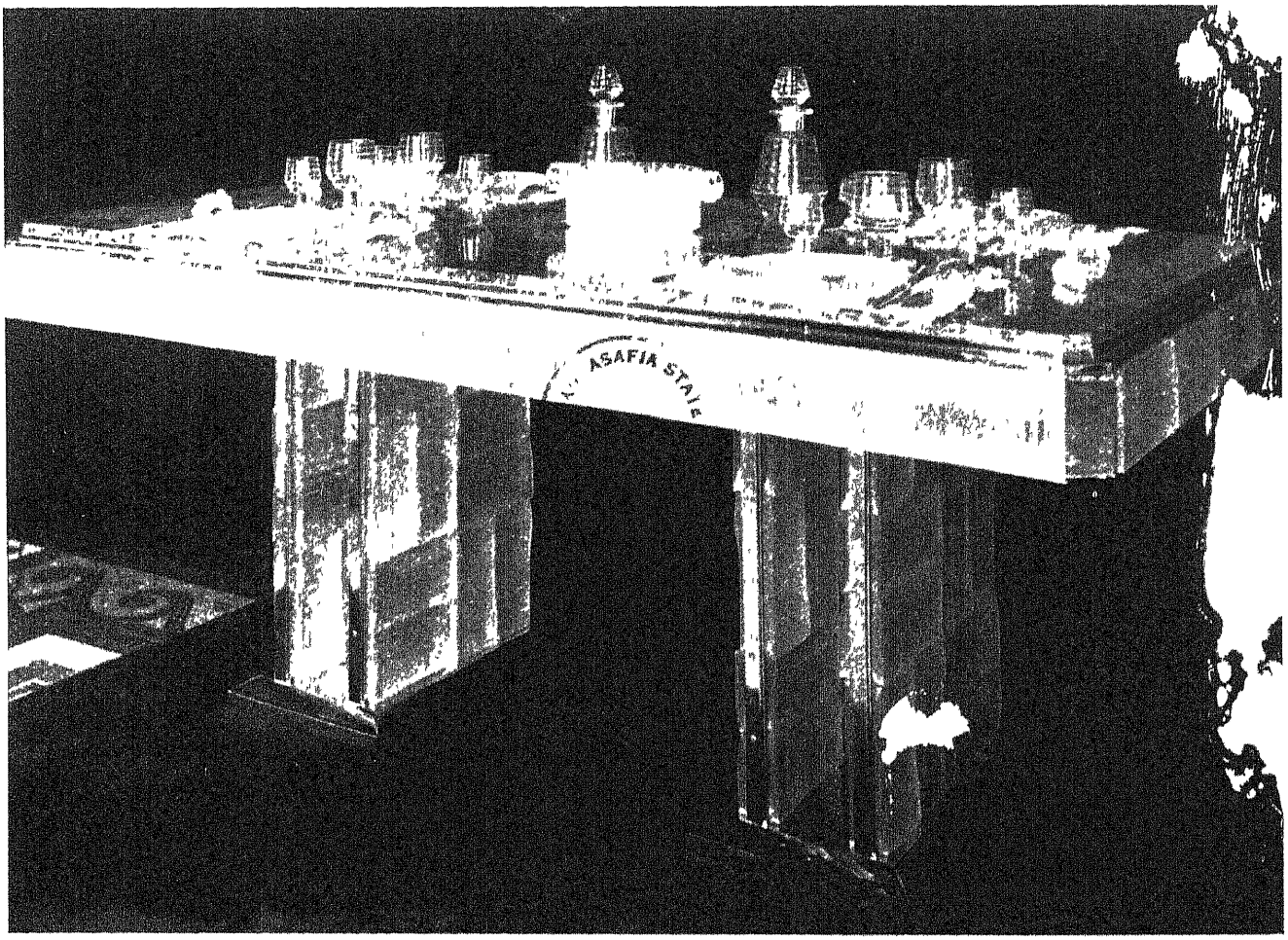




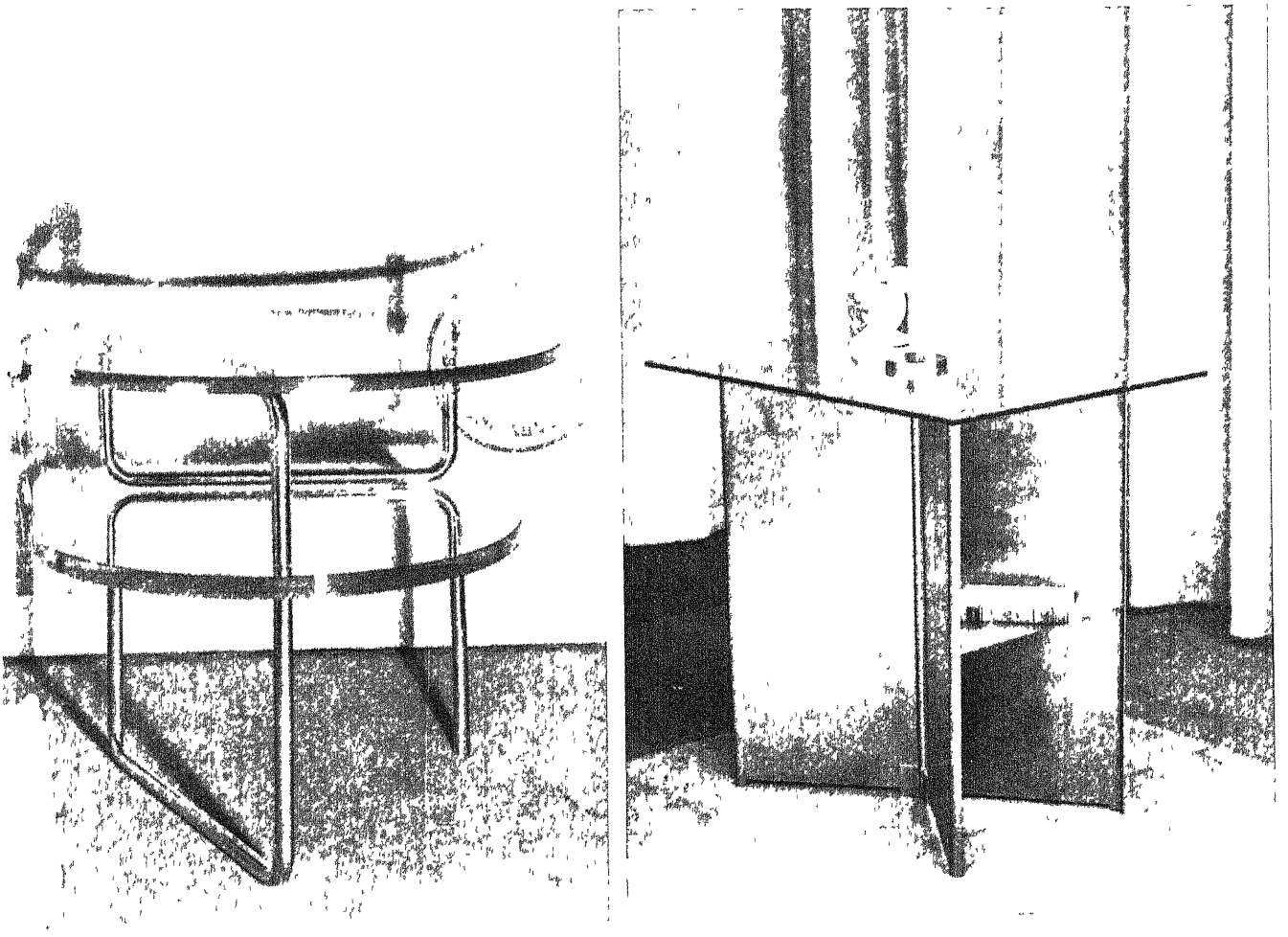
EUGENI PRINTZ, PARIS: DRESSING TABLE CONSTRUCTED OF HEAVY PLATE GLASS SHELVES PIVOTED ON CHROMIUM-PLATED SUPPORTS. TRIPLE MIRROR SET IN CHROMIUM-PLATED FRAMES



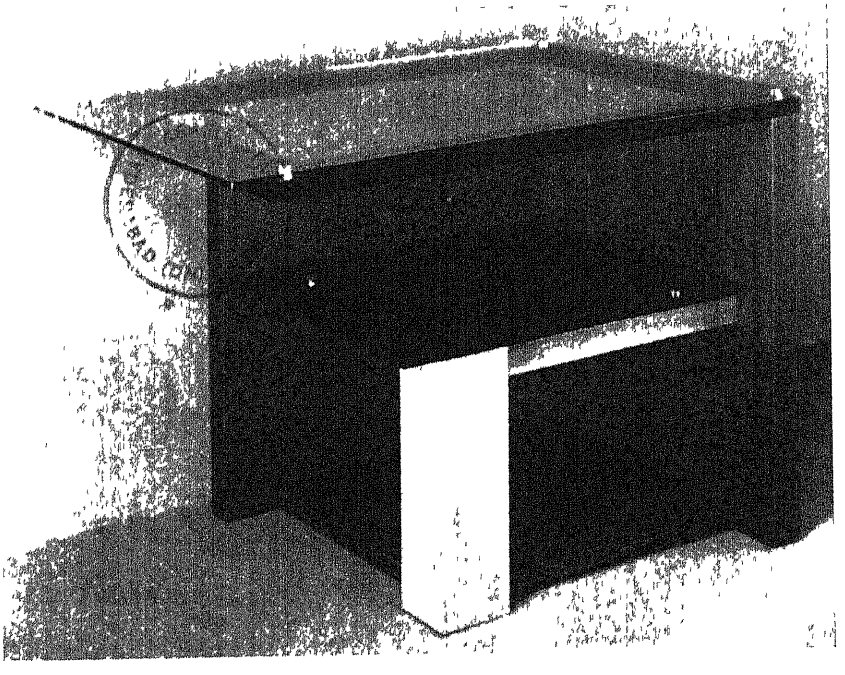
FRANZ SINGER, VIENNA. BUILT-IN DRESSING TABLE CONSTRUCTED ENTIRELY OF CRYSTAL AND MIRROR GLASS. ILLUMINATED SOFFITS OF DULL GLASS: EXECUTED BY PROFESSOR HARTMANN & CO.

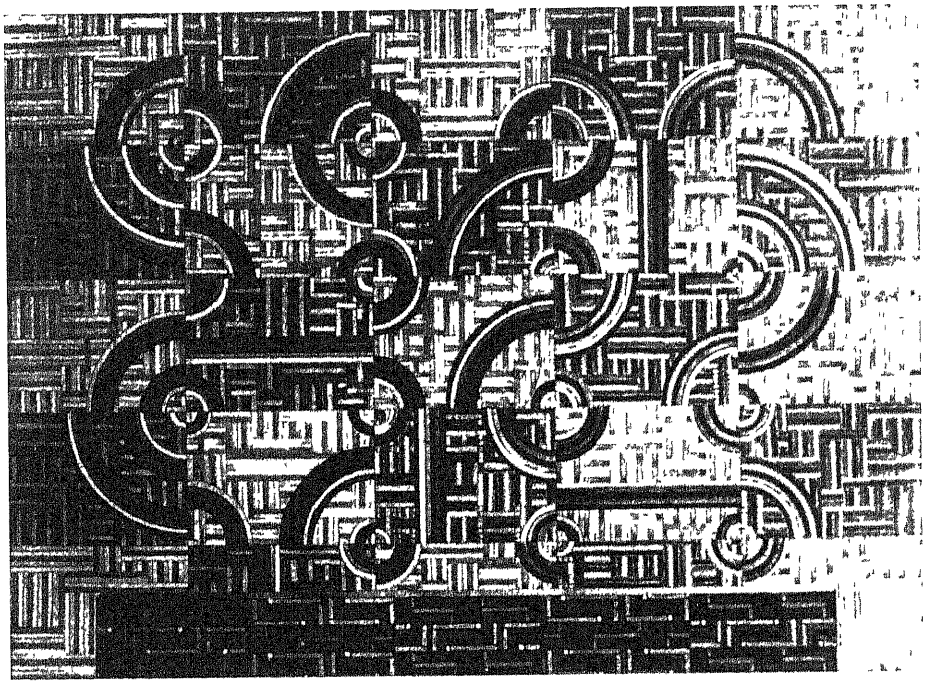



SABINO, PARIS: TABLE CONSTRUCTED ENTIRELY OF HEAVY GLASS SLABS, WITH MARBLE TOP



PROVILE, MURANO TABLE OF HEAVY PLATE GLASS AND CHROMIUM-PLATED TUBE G (CHOSEN MODEL) (ON LEFT) MAURICE DUFRENE, PARIS TABLE PLATE GLASS TAL PRODUCED BY LA MAÎTRISE FOR GALERIES LAFAYETTE (ON RIGHT) FR SZSINGER, VIENNA CORNER TABLE WITH PLATE GLASS TOP AND OPAQUE BLACK GLASS SHELVES EXECUTED BY PROFESSOR HARTMANN & CO (BELOW)





PUHL & WAGNER—GOTTFRIED HEINERSDORFF, BERLIN. DETAIL OF MOSAIC DESIGNED BY CESAR KLEIN (ABOVE). DECORATIVE WALL MOSAIC DESIGNED BY F. DULBERG (BELOW)